



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number: **0 475 554 A2**

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: **91300904.9**

(51) Int. Cl.⁵: **H04N 1/46**

(22) Date of filing: **04.02.91**

(30) Priority: **27.12.90 IL 96816**
30.12.90 IL 96829
15.01.91 IL 96955
05.02.90 IL 93274

(43) Date of publication of application:
18.03.92 Bulletin 92/12

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU NL SE

(71) Applicant: **SCITEX CORPORATION LTD.**
7 Hamada Street
Herzliya 46103(IL)

(72) Inventor: **Smilansky, Zeev**
7 Beerli Street
Rehovot(IL)
Inventor: **Melman, Haim Zvi**
3 Hagai Street

Kfar Saba(IL)
Inventor: **Bresler, Yoav**
24 Refldlm Street
Tel Aviv(IL)
Inventor: **Litvak, Matty J.**
42 Ha'atzmout Street
Petach Tikva(IL)
Inventor: **Kreitman, Haim**
14/3 Hagra Street
Kfar Saba(IL)
Inventor: **Yad-Shalom, Itai**
6 Hagilad Street
Kfar Saba(IL)

(74) Representative: **Hillier, Peter et al**
Reginald W. Barker & Co., 13, Charterhouse
Square
London, EC1M 6BA(GB)

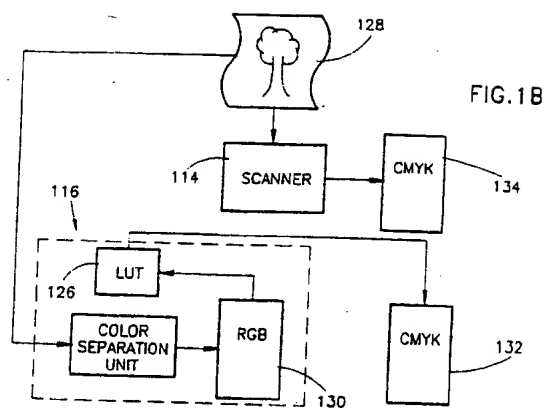
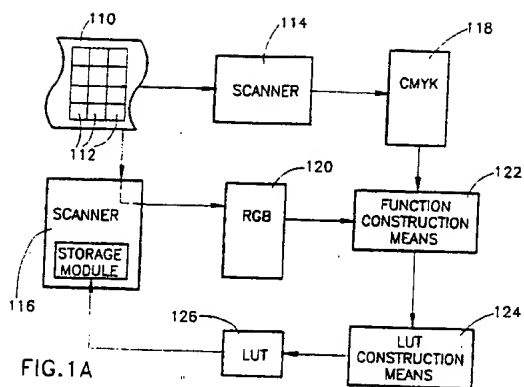
(54) **Apparatus and method for colour calibration.**

(57) There is disclosed technique and apparatus for calibrating a color processing device. The technique includes the steps of comparing a first digital representation of a colored image with a second digital representation thereof and employing at least the transformation to control operation of the color processing device to be calibrated. The first digital representation defines a plurality of first non-scalar color values and the second digital representation defines a plurality of second non-scalar color values corresponding to the plurality of the first non-scalar color values, thereby to provide a transformation pairing each individual one of the first non-scalar color values with a value relatively close to the corresponding one of the second non-scalar color values. The color processing device may be calibrated generally without reference to human aesthetic judgement.

There is additionally provided a method and apparatus for transforming an element of a domain of a first color printing device to an element of a domain of a second color printing device. The method comprises the steps of providing a first transformation from a first digital representation of a colored image to a second digital representation thereof and a second transformation from a third digital representation of a colored image to a fourth digital representation thereof and comparing the first transformation with the second transformation. The second transformation corresponds to the second color printing device, the first transformation corresponds to the first color printing device and the second and fourth digital representations are defined within a single color space.

EP 0 475 554 A2

BEST AVAILABLE COPY



FIELD OF THE INVENTION

The present invention relates to techniques for tone and color reproduction control in graphic arts.

5 BACKGROUND OF THE INVENTION

Scanning methods are reviewed in R. K. Molla, Electronic Colour Separation, R. K. Printing & Publishing, New York, 1988, the disclosure of which is incorporated herein by reference. The principles of color are explained in G. Wyszecki and W. S. Stiles, Color Science, Wiley & Sons, 1982, the disclosure of which is incorporated herein by reference.

Generally speaking, tone and color reproduction control in high quality graphic arts reproduction is still far from a science. This is particularly evident when a given acceptable result, already realized using given reproduction apparatus, is sought to be realized using other apparatus or using the same apparatus but with a different setting, such as a GCR setting relative to a normal "key black" setting. In such cases, a high degree of expertise, combined with time, effort, expense and patience is required to calibrate the additional apparatus. The results are not always satisfactory.

Unidimensional calibrations in graphic arts, in which a plurality of calibrations are carried out, each being a function of only one color, are known. State of the art techniques include gray balance correction and plotter output calibration techniques. Another example of unidimensional calibration is the automatic TCR (tone and color reproduction) correction process disclosed in published European Application 84307997.1 of Xerox Corporation (Publication number 0144188 A2).

The disadvantage of unidimensional calibrations is that they are only accurate in certain portions of the color space, since a full determination of color is multidimensional, typically having three or four components. For example, the teaching of the above-mentioned published European Application 8437997.1 is relatively inaccurate except in the area of a particular machine's primary color coordinate axes. Gray balance techniques are relatively inaccurate except for a relatively small volume of the color space, comprising gray colors only. Also, the apparatus disclosed in the above-cited published European Application 8437997.1 can be calibrated only by its own output.

Methods of computing a multidimensional function to fit a given set of vectors are known. Interpolative methods may be used if the data is suitably distributed. However the desired conditions regarding the distribution do not always hold in color processing applications, because the data is often not produced directly but rather is the end result of certain procedures (such as scanning, printing, etc.) which are performed on initial preselected data.

An article by Stone et al (Stone, M. C.; Cowan, W. B. and Beatty, J. C., "Color Gamut Mapping and the Printing of Digital Color Images", ACM Transactions on Graphics, 7(4), Oct. 1988, 249-292) discloses use of a colorimeter in mapping a color gamut and printing digital color images, using human aesthetic judgement as a criterion. Human aesthetic judgement is not always the most relevant nor the most efficient criterion for calibrating a color processing device, particularly when it is desired to use another color processing device as a calibration reference. The use of a colorimeter as disclosed by Stone et al is typically cumbersome and time-consuming.

United States Patent 4,500,919 to Schreiber discloses a system for producing color reproductions of an image in which an operator may interactively manipulate a display of the scanned image in order to introduce aesthetic, psychophysically referenced corrections therein. Schreiber teaches that it is desirable for such a system to provide automatic compensation for the effects of ink and paper while allowing the operator to input aesthetic alterations.

United States Patent 4,719,954 to Fujita et al. describes a method and apparatus for creating a color conversion table between scanned colors of a color chart, typically in the Red-Green-Blue (RGB) color coordinate system, and printable colors, typically in the Cyan-Magenta-Yellow-Black (CMYK) color coordinate system, and for using the color conversion table to reproduce a selected measured color in a color specimen. If the selected measured color does not coincide with a value in the color conversion table, an interpolation step is performed.

The method of Fujita et al also includes a correction step when reproduction is performed under different printing conditions. The correction step compensates for the difference between the two printing conditions.

Image creation systems typically comprise a computer with associated graphic software for generating digital representations of color images and/or modifying digital representations of color images, and a plotter or other color output device for transforming the digital representations into analog representations. The analog representation may be created on any suitable substrate, such as on a dia. If desired, e.g. in

pre-press applications, the resulting dia can be scanned.

Examples of commercially available graphic software are Photoshop, by Adobe Systems Inc., Mountain-view, CA, USA, usable in conjunction with the Mac II by Apple Computer Inc., USA; and PC Paintbrush Plus, by ZSoft, San Francisco, CA, USA, usable in conjunction with the IBM PC. Examples of commercially available plotters are 4cast, by DuPont, Wilmington, DE, USA, and the LVT Model 1620 digital image recorder by Light Valve Technology, Rochester, NY, USA.

SUMMARY OF THE INVENTION

The following terms as used in the present specification and claims should be construed in the following manner:

Analog representation of a colored image: A representation of a colored image which is perceivable by the human eye as a colored image. The representation may appear upon a transparency, a photograph, a CRT display, a printed page, etc.

Digital representation of a colored image: Any representation of a colored image which is expressed in discrete symbols, such as numerical symbols. A common digital representation of a colored image is a digital file comprising a plurality of numerical values corresponding to a plurality of pixels into which the colored image has been divided, each such numerical value representing some aspect pertaining to the colored appearance of the corresponding pixel.

Substrate: Physical apparatus bearing or displaying an analog representation of an image, e.g. transparency, Cromalin (registered trademark), CRT display, photograph, paper, surfaces suitable for painting on, etc.

Range of color processing apparatus: The totality of color values which can be output by the color processing apparatus.

Domain of color processing apparatus: The totality of color values which can be input by the color processing apparatus.

Color processing apparatus: Apparatus which inputs a first representation of a colored image (digital or analog) and converts it into a second representation thereof (analog or digital), thereby to define a transformation from at least a portion of the range into the domain.

Image creation system: Apparatus which creates an image internally or one which takes as input a representation of a color image and modifies it. Such a system can create the color image from geometrical shapes, can alter the shape and can select and/or modify the color of the color image.

Color reading apparatus: Apparatus which inputs an analog representation of a colored image and converts it to a digital representation thereof, e.g., ECSS, DECSS, colorimeters, spectrum analyzers, densitometers.

Typically, the digital representation is expressed in a coordinate system such as XYZ, CMYK, RGB, etc.

Printing machine/device/system; output apparatus, recording apparatus etc.: Any apparatus which inputs a digital representation of a colored image and converts it into an analog representation thereof. For example: conventional, offset, gravure, or other printing apparatus employing inks, conventional or direct digital proofing machines, plotters or color recorders which expose photographic materials, electrostatic printing systems employing powder colorants, color monitors, and color CRT displays.

Calibration: Adjusting color processing apparatus in order to obtain representations, having predetermined substantially objective color characteristics, of colored images sought to be processed.

Color value: A representation of a color, typically in a color coordinate system such as but not limited to RGB, L*a*b*, XYZ coordinate systems and device dependent coordinate systems such as color head signals e.g. RGB, ink percentages e.g. CMYK, etc.

Colorant, ink, etc.: Any stimulant of the human eye's light energy receptors, typically through emission, transmission or reflection of photons, including liquid colorants, powder colorants, photographic colorants, phosphors, etc.

Colorant values: A digital representation of the amount of a colorant which it is sought to use.

It is appreciated that any references to color, colored images, color values, colorant values, etc. in the present specification are intended to include the instances of black and white as colors or color values, black and white images, black colorant and ink, etc.

The following abbreviations are used:

TCR: tone and color reproduction
GCR: gray component replacement
UCR: Undercolor removal
UCA: Undercolor addition
RGB: red, green, blue. More generally, the term as used herein may refer to any color signals

produced by a color reading device. In a color separation scanner, the term normally refers to the color separation signals of the scanner prior to processing thereof.

CMYK: cyan, magenta, yellow, black (colorants such as inks). More generally, the term as used herein refers to any signals which may serve as input for a color printing device.

5 ECSS: electronic color separation scanner

DECSS: digital electronic color separation scanner

The present invention seeks to provide a technique for multidimensional calibration of graphic arts reproduction apparatus, which simplifies and greatly expedites the process of calibration of graphic arts reproduction apparatus to faithfully reproduce desired color and tone. Preferably, the technique provides
10 generally accurate calibration of the apparatus throughout substantially the entirety of the range of colors producible by the apparatus.

There is thus provided in accordance with a preferred embodiment of the present invention, a technique for calibrating graphic arts reproduction apparatus using color measuring apparatus (such as the "Smart Scanner" available from Scitex Corporation, Herzlia, Israel, colorimeters, densitometers, etc.) including the
15 steps of providing a transformation of or function from first color values to second color values and employing the transformation to control operation of graphic arts reproduction apparatus. The terms "transformation" and "function" are used interchangeably throughout the present specification. The transformation may be stored as a LUT (look up table) and the data may be transferred using any suitable communication method.

20 The following procedures, among others, may be greatly simplified and rendered more time efficient and effective using preferred embodiments of the present invention:

1. Incorporating a new color separation scanner (CSS), such as a digital electronic color separation scanner, into an existing reproduction system using automatic calibration that emulates the tone and color reproduction of the existing system.
- 25 2. Compensating for a different printing or proofing machine or a different setting on the same machine, by adjustment of the tone and color transformation of a digital electronic color separation scanner, or by adjustment of the digital representation of the picture, such that the printed picture characteristics of tone and color are nearly identical notwithstanding which printing machine or setting is employed.
3. Creating upon a first substrate a duplication of an analog representation of a colored image upon a
30 second substrate. Preferably, both substrates are formed of the same medium or of similar media.
4. Restoring an input copy for given color processing apparatus from an available output copy thereof. Typically, the input and output copies are hard copies. Preferably, the restored input copy, if input to the color processing apparatus, will result in an output copy substantially identical to the available output copy.
- 35 5. Incorporating a new digital electronic color separation scanner into an existing reproduction system using automatic calibration to achieve emulation of a UCR (under color removal), GCR (gray component replacement) or UCA (under color addition) reproduction produced by the existing system, or to emulate any other special reproduction setting to which the existing system may be set.
6. Calibration of a color monitor display with reference to output apparatus, thereby to provide a
40 representation of a colored image on a color monitor display which is substantially identical to a hard copy representation of that image processed on a given printing device.
7. Enabling an image processing device to process digital data defined in a coordinate system other than the coordinate system of the image processing device.

In accordance with a preferred embodiment of the present invention, the above procedures may be
45 carried out automatically or manually in a straight-forward algorithmic manner, substantially without trial and error. The procedures are preferably non-interactive and are without decision points requiring a decision by a human operator. The procedures may be carried out using an electronic color separation scanner having digital tone and color modules, such as the Smart Scanner, commercially available from Scitex Corporation Ltd., of Herzlia, Israel.

50 Preferably, the color processing device is calibrated such that substantially all inputs thereto may thereafter be satisfactorily processed thereby.

There is thus provided in accordance with a preferred embodiment of the present invention a technique for calibrating a color processing device including the steps of comparing a first digital representation of a colored image with a second digital representation thereof, the first digital representation defining a plurality
55 of first non-scalar color values, the second digital representation defining a plurality of second non-scalar color values corresponding to the plurality of the first non-scalar color values, thereby to provide a transformation pairing each individual one of the first non-scalar color values with a value relatively close to the corresponding one of the second non-scalar color values, and employing at least the transformation to

control operation of the color processing device to be calibrated, whereby the color processing device may be calibrated generally without reference to human aesthetic judgement.

Further in accordance with a preferred embodiment of the present invention, the technique is algorithmic.

5 Still further in accordance with a preferred embodiment of the present invention, the technique is non-interactive.

Additionally in accordance with a preferred embodiment of the present invention, the first and second digital representations are not provided by a colorimeter.

10 Additionally in accordance with a preferred embodiment of the present invention, the first and second digital representations are not in an XYZ coordinate system.

Further in accordance with a preferred embodiment of the present invention, the first and second digital representations are read by color reading apparatus whose colorimetric response differs from the colorimetric response of the human eye.

15 Still further in accordance with a preferred embodiment of the present invention, the first and second digital representations are read by color reading apparatus whose colorimetric response is not mathematically transformable to any colorimetric response similar to the colorimetric response of the human eye.

Still further in accordance with a preferred embodiment of the present invention, at least some of the non-scalar color values include a black component.

20 Additionally in accordance with a preferred embodiment of the present invention, the plurality of first non-scalar color values includes a plurality of 3-dimensional color values.

Further in accordance with a preferred embodiment of the present invention, the plurality of second non-scalar color values includes a plurality of 3-dimensional color values.

Still further in accordance with a preferred embodiment of the present invention, the color processing device includes a color reading device or printing device.

25 Additionally in accordance with a preferred embodiment of the present invention, the technique also includes, prior to the step of comparing, the step of automatically scanning an analog representation of the colored image, thereby to provide at least one of the first and second digital representations.

Still further in accordance with a preferred embodiment of the present invention, the technique also includes the step of using the calibrated device to create upon a second substrate a duplication of an analog representation of a colored image upon a first substrate.

30 Additionally in accordance with a preferred embodiment of the present invention, the technique also includes the step of using the calibrated device to create an input copy of a colored image which, when processed by the calibrated device, will result in a given output copy of the colored image.

35 Further in accordance with a preferred embodiment of the present invention, the technique also includes the step of comparing the second digital representation with a third digital representation of the colored image, the third digital representation defining a plurality of third non-scalar color values, thereby to provide a second transformation pairing each individual one of the second non-scalar color values with a value relatively close to the corresponding one of the third non-scalar color values and the step of employing includes the step of employing both the transformations to control operation of the color processing device 40 to be calibrated.

Additionally in accordance with a preferred embodiment of the present invention, the color processing device to be calibrated includes a color monitor display.

45 Still further in accordance with a preferred embodiment of the present invention, the first digital representation is characterized in that processing the first digital representation of the colored image with the color processing device provides a second representation of the colored image which defines a provided plurality of color values, each individual one of the provided plurality of color values being substantially equal to a corresponding one of a predetermined plurality of color values falling within the range of the color processing device.

50 According to another preferred embodiment of the present invention, there is provided apparatus for sampling the color processing characteristics of a color processing device, the color processing device being operative to convert a first representation of a colored image to a second representation thereof, the sampling apparatus including a first representation of a colored image characterized in that processing the first representation of the colored image with the color processing device provides a second representation of the colored image which defines a provided plurality of color values, each individual one of the provided 55 plurality of color values being substantially equal to a corresponding one of a predetermined plurality of color values falling within the range of the color processing device.

Further in accordance with a preferred embodiment of the present invention, the predetermined plurality of color values is characterized in that generally any region of a given size at least partially overlapping the

range of the color processing device contains therewithin at least a predetermined number of color values.

Still further in accordance with a preferred embodiment of the present invention, the first representation includes a digital representation or an analog representation.

Additionally in accordance with a preferred embodiment of the present invention, the second representation includes a digital representation.

According to yet a further preferred embodiment of the present invention, there is provided a method of constructing apparatus for sampling the color processing characteristics of a color processing device, the color processing device being operative to convert a first representation of a colored image to a second representation thereof, the method including the step of repeating at least once the steps of providing first and second representations of a colored image, the representations respectively including a first multiplicity of first color values and a second multiplicity of second color values corresponding thereto, the first and second representations being characterized in that processing the first representation with the color processing device defines the second representation, comparing the first representation of the colored image with the second representation thereof, thereby to provide a transformation, characterized in that operating the transformation on each individual one of the second multiplicity of second color values gives a value substantially equal to the corresponding one of the first multiplicity of first color values, and operating the transformation on the first representation of the colored image, thereby to provide a third representation thereof.

Further in accordance with a preferred embodiment of the present invention, the transformation is a function defined and continuous over generally the entirety of the range of the color processing device.

In accordance with a preferred embodiment of the present invention there is provided apparatus for sampling the color processing characteristics of a color processing device, the sampling apparatus being constructed in accordance with a method for constructing sampling apparatus, the method being in accordance with a preferred embodiment of the present invention.

Further in accordance with a preferred embodiment of the present invention, the step of repeating at least once includes the step of repeating at least twice the steps of providing, processing, comparing and operating and for each repetition from the second onward, the first representation of the colored image provided includes the third representation of the colored image provided in the previous repetition.

Additionally in accordance with a preferred embodiment of the present invention, the third representation defines a plurality of color values and the step of repeating at least twice includes the step of repeating the steps of providing, processing, comparing and operating until the plurality of color values defined by the third representation obtained in the last repetition are at a predetermined degree of closeness to a predetermined plurality of color values located within the range of the color processing device.

There is also provided in accordance with a preferred embodiment of the present invention, a technique for quality control of a color processing device operative to convert a first representation of a colored image to a second representation thereof, the technique including the steps of providing apparatus for sampling the color processing characteristics of the color processing device, the sampling apparatus including a first representation of a colored image characterized in that processing the first representation of the colored image with the color processing device provides a second representation of the colored image which defines a provided plurality of color values, each individual one of the provided plurality of color values being substantially equal to a corresponding one of a predetermined plurality of color values falling within the range of the color processing device, processing the sampling apparatus on the color processing device, and employing the results of the processing step of control operation of the color processing device.

There is also provided in accordance with yet another preferred embodiment of the present invention a technique for repeatability testing of a color processing device operative to convert a first representation of a colored image to a second representation thereof, the technique including the steps of providing apparatus for sampling the color processing characteristics of the color processing device, the sampling apparatus including a first representation of a colored image characterized in that processing the first representation of the colored image with the color processing device provides a second representation of the colored image which defines a provided plurality of color values, each individual one of the provided plurality of color values being substantially equal to a corresponding one of a predetermined plurality of color values falling within the range of the color processing device, processing the sampling apparatus on the color processing device; repeating the step of processing on at least one further occasion, and comparing the results of at least two repetitions of the processing steps.

There is provided, in accordance with the present invention, apparatus for transforming an element of a domain of a first color printing device to an element of a domain of a second color printing device and a technique for producing same. The invention is described herein as an apparatus, it being understood that the invention includes a method for performing the operations of the apparatus.

The apparatus includes apparatus for providing a first transformation from a first digital representation of a colored image to a second digital representation thereof and a second transformation from a third digital representation of a colored image to a fourth digital representation thereof and apparatus for comparing the first transformation with the second transformation. The second transformation corresponding to the second color printing device, the first transformation corresponding to the first color printing device and the second and fourth digital representations being defined within a single color space.

Additionally, in accordance with the present invention, the apparatus includes apparatus for storing the output of the apparatus for comparing.

Further, in accordance with the present invention, the output of the apparatus for comparing defines a first plurality of matchings between a first plurality of elements of the domain of the second color printing device and a corresponding first plurality of elements of the domain of the first color printing device and wherein the apparatus for storing include apparatus for providing a second plurality of matchings between the domain of the first color printing device and the domain of the second color printing device, the second plurality exceeding the first plurality in number.

Still further, in accordance with the present invention, the apparatus for storing also includes apparatus for modifying at least some of the corresponding first plurality of elements of the domain of the first color printing device operative prior to the operation of the apparatus for providing a second plurality of matchings.

Moreover, in accordance with the present invention, the apparatus for providing includes apparatus for interpolating between individual ones of the first plurality of matchings, thereby to provide individual ones from among the second plurality of matchings. The apparatus for interpolating includes apparatus for carrying out non-linear interpolation between individual ones of the first plurality of matchings. The apparatus for carrying out non-linear interpolation includes apparatus for fitting a tensor of splines to individual ones of the first plurality of elements of the first domain.

Additionally, in accordance with the present invention, the apparatus of the present invention additionally includes apparatus for employing the stored results to control operation of the first color printing device.

Furthermore, in accordance with the present invention, the apparatus for comparing includes apparatus for searching among the elements of the second digital representation for a plurality of close elements whose values are close to an element of the fourth digital representation, apparatus for forming a multiplicity of subsets, each individual one of the subsets containing some of the plurality of close elements, and apparatus for selecting individual ones from among the multiplicity of subsets. The apparatus for comparing also includes for each individual selected subset, first apparatus for combining the elements of the first digital representation corresponding to the members of the individual selected subset, thereby to define a combination value for the individual selected subset and second apparatus for combining the combination values of each of the individual selected subsets, thereby to provide an element within the first digital representation corresponding to the element within the fourth representation.

Additionally, in accordance with the present invention, the first apparatus for combining includes apparatus for assigning a weight to each member of each individual selected subset, the weights being characterized in that, for each individual selected subset, the element of the fourth digital representation is the center of mass of the weighted members of that subset and apparatus for computing a weighted sum of the members of the individual selected subset. The second apparatus for combining includes apparatus for assigning a weight to each individual selected subset, the weights reflecting the arrangement of the members of the individual selected subset relative to the element of the fourth digital representation and apparatus for computing a weighted sum of the members of the individual selected subset.

Moreover, in accordance with the present invention, the apparatus for selecting includes apparatus for inspecting the arrangements of the members of the multiplicity of subsets relative to the element of the fourth digital representation and apparatus for selecting individual ones from among the multiplicity of subsets in accordance with the result of the step of inspecting.

Still further, in accordance with the present invention, the apparatus includes apparatus for producing a new first transformation using the stored output and apparatus for repeatedly operating the apparatus for comparing and for storing thereby to produce a new transformation between an element of the domain of the first color printing device to an element of the domain of the second color printing device. The apparatus for employing utilize a color converter for converting the domain of the first color printing device to the domain of the second color printing device.

There is also provided, in accordance with the present invention, apparatus for quantifying the appearance of an analog representation of a location of a colored image including apparatus for providing an n-dimensional representation of the location, wherein n is at least 4.

Additionally, in accordance with the present invention, the analog representation of the location is

provided by printing a digital representation of the location and wherein the apparatus for providing includes apparatus for providing a 3 dimensional representation of the color of the location and apparatus for computing at least a fourth value as a function of the digital representation of the location.

Alternatively, the apparatus for computing may be replaced by apparatus for measuring the fourth value directly from the analog representation.

Furthermore, in accordance with the present invention, the three dimensional representation is a colorimetric representation which can be CIE XYZ or CIE L*a*b*.

There is additionally provided, in accordance with the present invention, a system for converting between a digital and an analog representation of an image comprising a translation system for translating a reading and writing point across a substrate, a color proofer comprising the writing point for writing, from the digital representation, the analog representation onto the substrate and a color reading system comprising the reading point for reading the digital representation from the analog representation.

Additionally, in accordance with the present invention, the translation system comprises a drum for rotating the substrate and a translating carriage for translating along the drum.

Moreover, in accordance with the present invention, the system includes apparatus for transforming an element of a domain of a first color printing device to an element of a domain of a second color printing device such as described hereinabove.

There is further provided, in accordance with a preferred embodiment of the present invention, a technique for controlling the operation of an image processing device having a first color coordinate system and including the steps of receiving a digital representation of a color image defined in a second color coordinate system, providing a transformation between the first color coordinate system and the second color coordinate system, employing the transformation to transform the digital representation of the color image into a transformed digital representation of the color image in the first color coordinate system and employing the image processing device to modify the transformed digital representation of the color image.

Additionally, in accordance with a preferred embodiment of the present invention, the digital representation is provided by an input device. The second color coordinate system is the coordinate system of the input device.

Furthermore, in accordance with a preferred embodiment of the present invention, the step of employing the transformation is performed by a device having the second color coordinate system. Alternatively, the step of employing the transformation is performed by the image processing device.

There is further provided, in accordance with a preferred embodiment of the present invention, an image processing device having a first color coordinate system including apparatus for receiving a digital representation of a color image defined in a second color coordinate system, transformation construction apparatus for providing a transformation between the first color coordinate system and the second color coordinate system and apparatus for employing the transformation to transform the digital representation of the color image into a transformed digital representation of the color image in the first color coordinate system. The image processing device is operative to modify the transformed digital representation of the color image.

Additionally, in accordance with a preferred embodiment of the present invention, the digital representation is provided by an input device.

Further, in accordance with a preferred embodiment of the present invention, the second color coordinate system is the coordinate system of the input device.

Finally, in accordance with a preferred embodiment of the present invention, the transformation construction apparatus form part of a device having the second color coordinate system.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be understood and appreciated from the following detailed description, taken in conjunction with the drawings in which:

Figs. 1A and 1B are schematic illustrations respectively of the generation of a calibration transformation or function and its employment in the incorporation of a new color separation scanner or other color reading device into an existing reproduction system employing automatic calibration in accordance with a preferred embodiment of the present invention;

Fig. 2A is a schematic illustration of compensation for a new printing or proofing machine in accordance with a preferred embodiment of the present invention;

Fig. 2B is a schematic illustration of an alternative method of utilizing the calibration information provided by the technique of Fig. 2A;

Figs. 3A, 3B and 3C are schematic illustrations which illustrate respectively a calibration method and two

alternative subsequent uses therefor for generating duplications in accordance with a preferred embodiment of the present invention;

Figs. 4A-4E are schematic illustrations of a technique for restoring an input copy from an output copy in accordance with a preferred embodiment of the present invention;

5 Figs. 5A and 5B are schematic illustrations of the generation of a calibration transformation or function and its employment in incorporation of a new digital electronic color separation scanner in an existing system for producing UCR, GCR and UCA and any other special setting tone and color reproductions, in accordance with respective alternative embodiments of the present invention;

10 Fig. 6 is a schematic illustration of a method for calibration of a color monitor display with reference to output apparatus in accordance with a further preferred embodiment of the present invention;

Figs. 7A-7B are schematic illustrations of a reiterative method for providing an improved database for sampling the color processing characteristics of color processing apparatus;

Fig. 8 is an alternative embodiment of a system for performing the method of Figs. 2A and 2B;

15 Fig. 9 is a block diagram illustration of a technique for transforming a domain of a first color printing device to a domain of a second color printing device, operative in accordance with an alternative embodiment of the present invention;

Fig. 10 is a flow chart illustration of a CMY-CMY conversion technique useful in the technique of Fig. 9;

Fig. 11 is a flow chart illustration of an interpolation technique useful in the embodiment of Fig. 9;

20 Fig. 12 is a block diagram illustration of a system for reading and writing an image constructed and operative in accordance with the present invention;

Fig. 13 is a general block diagram illustrating apparatus for calibrating a scanner to an image processing unit to a scanner, the apparatus being constructed and operative in accordance with an alternative embodiment of the present invention; and

Fig. 14 is a general block diagram illustrating use of the apparatus of Fig. 13.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

It is an object of the present invention to provide a technique for multidimensional and preferably full range calibration of graphic arts reproduction apparatus, which simplifies and greatly expedites the process of calibration of graphic arts reproduction apparatus to faithfully reproduce desired tone and color. The calibration is accomplished by:

- 30 (a) providing a database comprising a set of color values representing a colored image which it is sought to reproduce by using output apparatus employing a plurality of inks or other colorants in amounts defined by the set of color values; and
- 35 (b) computing a color calibration function or transformation which fits the database and allows accurate interpolation procedures to be carried out on all color values which are reproducible by the apparatus employed, although only a subset of these values were included in the original database. The function also preferably allows accurate extrapolation procedures to be carried out on color values which fall outside of the convex hull spanned by the color values in the database. Preferably, the function is stored
- 40 as a look up table (LUT). Alternatively, it can be stored in any other suitable form, such as an analytic formula, etc.

The step of computing a color calibration function

45 A mathematical formulation of the problem is as follows: given a set of p points defined in a d -dimensional input space and given n sets, each comprising p scalars, to which scalars the points respectively correspond. Each set is contained within a unidimensional space, the n unidimensional spaces corresponding to the n coordinates defining the output space. Find n relatively smooth functions f_1, \dots, f_n from the d -dimensional space to each of the n unidimensional spaces, such that each of the functions generally

50 fits the data, thereby to allow generally accurate interpolation.
For example: $p = 1676$, $d = 3$, $n = 4$. The p points are 1676 RGB values read by a color reading device, each value being an ordered 3-member set (r, g, b) defining the respective quantities of Red, Green and Blue detected at each of 1676 locations upon a multicolored input image which is to be read. The values r , g and b are scalars and $0 \leq r, g, b \leq 255$. Each of the p points of the multicolored input image is to be

55 represented by an output image using Cyan, Magenta, Yellow and Black inks (which define four unidimensional spaces), in quantities respectively represented by positive variables c, m, y and k . Four functions, each defined from the three dimensional (r, g, b) space to a respective one of the four one-dimensional c, m, y and k spaces, are to be computed, which will respectively determine the quantity of each of the four

inks which is to be provided to reproduce any particular color (r, g, b).

Any suitable device can be employed to "read" the color values of the database in any of the various embodiments described herein. Inter alia, any of the following devices may be employed: colorimeters, analog electronic color separation scanners, digital electronic color separation scanners, densitometers, spectrum analyzers.

Any suitable color reading device may be used as a calibration reference, such as the Smart Scanner available from Scitex. In some applications, such as Application No. 2 described hereinbelow, it may be desirable to use a scanner whose colorimetric response is similar to that of the human eye, or a scanner whose colorimetric response is mathematically transformable to a response similar to that of a human eye.

Any coordinate system suitable for the particular application may be used to represent the color values (XYZ, RGB, etc.). Preferably, substantially all of the colors of the reference color space should be distinguishable by the device used as a calibration reference.

The procedure disclosed hereinbelow is relatively insensitive to the selection of the particular set of p points. In particular, the selected points need not be arranged at regular intervals and do not even need to be distributed homogeneously. However, it is generally preferable to provide a minimum density of data distribution throughout the color space or subspace of interest.

A preferred procedure for computing each function is as follows:

a. Define a set of boxes in the d-dimensional input space. The boxes are preferably selected to be of more than one size, preferably of two different sizes. The set of boxes of each particular size covers the entire d-dimensional space, preferably with overlap. Preferably, the length of the side of each box will be 1/16 to 1/2 of the length of each dimension of the d-dimensional input space, and the boxes will be defined such that the centers thereof are spaced at intervals which are half of the lengths of the sides of the boxes.

For example, and with reference to the numerical example outlined above with eight-bit color values, $d=3$ and the d-dimensional space is the (r,g,b) cube $[0,255]^3$. In this instance, two sets of boxes may be defined. Each of the 5^3 boxes in the first set is of dimensions 128^3 , and each of the 9^3 boxes in the second set is of dimensions 64^3 . Boxes of the first set may be defined throughout the cube at intervals of 64 units along each of the three dimensions, beginning at the origin (0,0,0). Boxes of the second set may be defined throughout the cube at intervals of 32 units along each of the three dimensions, beginning at the origin (0,0,0). If a box defined as above is not entirely contained within the d-dimensional space (such as the boxes whose centers are at the origin, only 1/8 of which are contained within the d-dimensional space), the box is defined as the overlap of the box (when defined as above) with the d-dimensional space. For example, the first box in the first set will be $[0,64]^3$.

b. Approximate the transformation within each box by computing a function from that box to the (c,m,y,k) space which optimally fits the data points within that box. Any suitable curve fitting method may be used, such as the methods described in chapter 4 of J. Stoer, Introduction to Numerical Analysis, Springer-Verlag, New York, 1980.

If linear approximation methods are used, it is desirable, in the present example, that there be at least 10 points in each box of dimensions 64^3 , including those boxes which are only partially contained within the d-dimensional space, such as the box whose center is at the origin. Therefore, there should preferably be a more dense distribution of points near the periphery of the d-dimensional space.

c. For each of the p points in the input space (or, if the function is stored in LUT form, for each of the LUT points), define the function at that point as a weighted sum of all the approximating functions from all the boxes (some of the weights may be zero). The weight assigned to each approximating function in the weighted sum typically decreases with the size of the corresponding box and with the distance between the center of the corresponding box and the point and increases with the number of points contained within the corresponding box. According to one preferred embodiment of the present invention, a nonanalytical function may be used. According to a further preferred embodiment of the present invention, an analytical formula may be used. One such analytical formula giving the weight for the value of the approximation function f_i derived from box i at a point x_j in box j is:

$$\text{weight}(f_i, x_j) = \frac{(\text{number of points in box } i)}{(\text{volume of box } i) \times (\text{distance of point } x_j \text{ from center of box } i)^2}$$

The weights are non-negative. For each x_j , they sum to unity over the totality of boxes of all sizes.

These computations may be performed by any suitable computer or by a suitable digital electronic color separation scanner such as the Smart Scanner available from Scitex. Appendix A is a computer listing of a procedure which inputs a plurality of p d-dimensional color values and a plurality of sets containing p scalars each, and uses the above method to output a color calibration LUT in accordance with a preferred embodiment of the present invention.

Alternative procedures for computing each function $f_1 \dots f_n$ are:

1. Using a regular grid to order the input or output data, and inverting one of the transforms, as disclosed in the above-referenced article by Stone et al, the disclosure of which is incorporated herein by reference; or
2. Using iterative methods to optimize a sample of the values of the function. Iterative methods are described in chapter 8 of J. Stoer, *Introduction to Numerical Analysis*, Springer-Verlag, New York, 1980.

It is noted that the above procedures are merely illustrative of the type of mathematical procedures which could be used to compute color calibration functions or transformations having the characteristics specified above.

The step of providing a database

As stated hereinabove, the method of the present invention includes the step of providing a database comprising a representation of a plurality of colors, which database may then be processed by color processing apparatus. To continue the above numerical example, the original database, whose characteristics can be directly controlled by the operator, are the unprocessed RGB values and these values may be recorded, e.g. on a transparency, and then scanned. The data which forms the basis for the function construction procedure described above will then be the processed data, i.e. the transformed form of the original database obtained by processing (recording and scanning) the original database.

It is therefore appreciated that a "good" database for sampling the operation of color processing apparatus over a range or subrange thereof has the property that, once processed by the color processing apparatus, it will, for generally any region of a predetermined size overlapping or contained within the range or subrange, include at least a predetermined number of color values located interiorly of that region. A more general requirement for a "good" database is that, once processed, it is of a predetermined degree of closeness to a "target" comprising a predetermined plurality of color values. However, it is generally the case that if a database which possessed this property prior to being processed is subsequently processed by the color processing apparatus, the processed data will no longer possess the desired property but rather will be "distorted" due to the transformations of the data induced by the color processing procedure.

The color calibration function computation procedure described above can be used in accordance with the method described hereinbelow to produce a "good" database, in the sense set forth hereinabove, from an initial database which may be far from possessing the desired characteristic set forth hereinabove. According to one preferred embodiment, the initial database, prior to being processed by the color processing apparatus, comprises a set of points distributed generally evenly throughout generally the entirety of the domain of the apparatus.

The improvement process of the initial database may, if desired, be continued iteratively until any desired degree of "quality", in the sense described hereinabove, of the final database, is attained. Typically, only three or less such iterations are necessary.

A preferred method in which the function construction procedure described hereinabove is used to provide an improved database will now be described with reference to Figs. 7A-7B, which are schematic illustrations of the steps of the method. Each of steps (a) - (e) of the method is designated in Fig. 7A by the appropriate letter. Step (f) is illustrated in Fig. 7B.

It is appreciated that the method of Figs. 7A-7B may be employed to construct a first database which, once processed by given color processing apparatus, provides a second, processed database which defines a plurality of color values, each of which is substantially equal to a corresponding one of any predetermined "target" plurality of color values physically obtainable by means of the color processing apparatus. The steps illustrated in Fig. 7A are as follows:

- (a) Provide an initial digital representation of a colored image, the colored image comprising a plurality of colored locations. The digital representation comprises a plurality of color values such as RGB values, to be referred to as "RGB₀ data", which corresponds to the plurality of colored locations. An example of a preferred initial database useful in deriving a final database for using a Smart Scanner (commercially available from Scitex Corporation, Herzlia, Israel) for sampling the operation of a 4cast color recording device (commercially available from DuPont) is disclosed in Appendix C. The corresponding final database, provided in accordance with the method of Figs. 7A-7B, is disclosed in

Appendix D.

Record the RGB_0 data with a color recording device 56 (such as a 4cast, commercially available from DuPont) to obtain an analog representation 52 of the colored image comprising a plurality of colored locations 54. Preferably, the initial digital representation 50 of the initial colored image will span generally the entirety of the color coordinate system defined by the color recording device.

(b) Read the image 52 using desired input apparatus 58, thereby defining a plurality 60 of color values such as RGB values, to be referred to as " RGB_1 data", which correspond to the plurality of colored locations 54. It is noted that, generally, the RGB_1 data obtained from the original RGB_0 data by recording and scanning will no longer have the same values as the original RGB_0 data. If the values of the RGB_1 data are not sufficiently close to a "target" predetermined plurality of color values, follow steps (c) to (f) below:

(c) Compute a function f_1 from the RGB_1 data 60 to the RGB_0 data 50 by pairing each RGB_1 datum with the value of the corresponding RGB_0 datum and by using the color calibration function construction method described hereinabove. The computation and storage of the color calibration function may be performed by any suitable computation means 62 and storage means 66 respectively. Two software implementations of computation means 62 in conjunction with storage means 66 are disclosed herein as Appendix A (hardware environment: Prisma System workstation, commercially available from Scitex) and Appendix B (hardware environment: Smart Scanner, commercially available from Scitex).

(d) Define RGB_2 data 64 by operating f_1 on each of the RGB_0 values. The RGB_2 data is a digital representation of an "improved" database (relative to the initial RGB_0 database) in the sense described hereinabove with reference to the term "good" database. The operation of function f_1 on the data 50 may be performed by any suitable means 66, such as the Scitex Smart Scanner or any conventional computer such as an IBM PC.

(e) If an analog representation of the improved database is desired, output the RGB_2 file 64, which may be stored by any suitable means, such as the storage module of the Smart Scanner, using color output device 56 as a color printing device and using a substrate 68 of a medium generally identical to the medium of the substrate 52.

(f) If it is desired to continue the above procedure to obtain a still further improved database, i.e. a database whose values are still closer to the "target" predetermined plurality of color values, continue as in Fig. 7B: Provide a digital representation of the output 68 of (e), as in (b), using input apparatus 58, thereby defining a plurality of color values such as RGB values, to be referred to as " RGB'_2 data" 80.

Define a function f_2 from the RGB'_2 data 80 to the RGB_2 data 64 and store it in module 66, as in (c) above.

Define and store RGB_3 data 82 by operating f_2 on each of the RGB_2 values 64, as in (d) above.

If desired, output the RGB_3 data file, as in (e) above. The resulting picture 84 is an analog representation of the still further improved database.

The reiteration or loop of Fig. 7B may be repeated as many times as desired to cause the resultant database to approach the "target" predetermined plurality of color values to any desired degree of closeness.

It is appreciated that the method of providing a data base and the method of computing a color calibration function, both as shown and described hereinabove, have a wide variety of applications when used independently or in conjunction with one another. For example, the method of providing a database described hereinabove is useful not merely for the purpose of computing a color calibration function as described hereinabove, but also in any situation in which it is desired to sample the functioning or the characteristics of color processing apparatus, e.g. in quality control and repeatability test situations such as those presented in the foregoing examples. It is appreciated that the foregoing examples are merely illustrative of possible applications in which it is desired to sample the functioning or the characteristics of color processing apparatus.

Example A: A typical situation in which the method of providing a database as shown and described hereinabove is useful in quality control is that of a printing machine or other output apparatus which is found to produce somewhat varying output as a function of fluctuating environmental factors. A database designed to sample the characteristics of the printing machine, constructed in accordance with the method shown and described hereinabove, may be printed periodically on the printing machine. The database is preferably constructed to sample the printing of colors which are known to be sensitive or problematic when printed on that particular machine. The hard copy is then scanned and a suitable color calibration function is constructed to compensate for any drift which may have occurred relative to a previously defined standard.

Example B: The method of providing a database may also be useful in quality control of color reading apparatus such as scanners. For example, if a scanner is thought to be defective, a database designed to

sample the characteristics of that scanner, constructed in accordance with the method shown and described hereinabove, may be scanned by the putatively defective scanner and the result compared to the results of scanning the same database using results from a scanner known to be properly functional. The database is preferably constructed to sample the scanning of colors which are known to be sensitive or problematic when scanned on that particular scanner.

It is appreciated that the above examples are merely illustrative of possible quality control applications. The term "quality control" is here employed to describe any application in which the quality of performance of color processing apparatus is of interest. More generally, it also applies to any situation in which it is of interest to sample the performance of color processing apparatus.

Example C: A typical situation in which the method of providing a database as shown and described hereinabove is useful in repeatability control is that of a scanner which is suspected of being improperly functional for a certain subregion (or the entire region) of the output space, comprising a plurality of colors. The database provision method shown and described hereinabove may be employed to provide a transparency or other representation which, when scanned, will be mapped onto the subregion in question. This transparency may be used to test the scanner and effect suitable corrective procedures thereupon. It is appreciated that this example is merely illustrative of possible repeatability control applications. The term "repeatability control" or "repeatability testing" is here employed to describe any application in which the repeatability of performance of color processing apparatus over time and/or over changing environmental conditions is of interest.

A number of applications of the method of computing a color calibration function, preferably in conjunction with the method of providing a database, both methods as shown and described hereinabove, will be described in detail herein, however, they are intended to be merely illustrative of the range of possible applications.

It is appreciated that only one or a few embodiments of each of the applications disclosed is described in detail hereinbelow, and that the details of implementation described herein are merely illustrative and by way of example, and that the embodiments described herein may be modified in any suitable manner. For example, any of the applications herein may be implemented on any suitable computer, such as an IBM PC, by performing the required transformation on the digital output file of any ECSS. Measurements of the database may be carried out automatically, as disclosed herein, or manually, using any suitable equipment such as a spectrum analyzer. The measured data may then be input into the computer either automatically or manually.

Application #1: Calibration of a first color scanner with reference to a second color scanner

Reference is now made to Figs. 1A and 1B which illustrate respectively the generation of a calibration transformation and its employment in the incorporation of a new digital electronic color separation scanner into an existing reproduction system employing automatic calibration in accordance with a preferred embodiment of the present invention.

Conventionally, an existing reproduction work shop that purchases a new electronic color separation scanner (CSS) already owns one or more CSSs. During years of work and interaction with their customers, the shop has developed its own unique tone and color reproduction parameters that characterize the reproductions they produce. The tone and color reproduction parameters may depend on at least the following factors:

- The type of originals employed, i.e. the brand and type of transparency or reflective copy;
- The color separation scanner employed and its calibration;
- The plotting system employed;
- The printing system employed; and
- Aesthetic considerations.

The introduction of a new ECSS normally changes the tone and color reproduction parameters that are realized. A long and tedious process of adjustment of the new ECSS is normally required, involving numerous adjustments by trial and error. Normally the tone and color reproduction parameters existing prior to introduction of the new ECSS are never fully realized.

In accordance with the present invention, the trial and error techniques currently in use are replaced by a fully- or, if desired, semi-automated well-defined and generally algorithmic technique.

In accordance with a preferred embodiment of the present invention, as illustrated in Fig. 1A, there is provided a substrate, such as a transparency, bearing an analog representation of a colored image 110 which typically comprises a plurality of colored locations 112. Preferably, the colored image will comprise a "good" database constructed in accordance with the database provision method shown and described

hereinabove. Here a "good" database is one which, once scanned by the scanner 114 of Fig. 1A, has a predetermined pattern such as a pattern in which there is a minimum density of data in every area of interest. The predetermined pattern may, for example, be a generally even distribution throughout generally the entirety of the physically producible color space, if it is desired to sample generally the entirety of the color space. Therefore, when constructing the colored image 110 in accordance with the database provision method of Fig. 7, the scanner 114 should preferably be used to scan the colored image 52. Alternatively, scanner 116 can be used.

The colored image 110 is scanned both by an existing ECSS 114 which it is sought to emulate and by the new digital ECSS 116. From the existing ECSS 114 a digital representation 118, comprising color values (preferably CMYK values) each corresponding to an individual one of the locations 112, is obtained. These values relate to the amounts of each colorant to be provided by a printing machine.

From the DECSS 116, a digital representation 120 of the locations 112, comprising color values (preferably RGB values) corresponding to each location 112 is provided. These values correspond to the color separations.

It is appreciated that references to RGB values and CMYK values, etc. throughout the present specification are intended to be examples of suitable color coordinates which can be replaced by any other suitable color coordinates, such as XYZ coordinates. Furthermore, there need not be exactly three input dimensions, or exactly three or four output dimensions. Any suitable number of dimensions may be employed.

Function construction means 122 receives pluralities of corresponding color values 118 and 120. Function construction means 122 is constructed and operative to compute a color calibration function from the color values 120 to the color values 118 in accordance with the color calibration function computation procedure shown and described hereinabove. The color calibration function computed by function construction means 122 is received by LUT construction means 124. LUT construction means 124 is operative to construct a LUT 126 relating the colorant values 118 to the RGB values 120 and to store the LUT 126, such as in the TCR module of the scanner 116. Software implementations of function construction and "on the fly" LUT construction are disclosed in Appendices A and B.

It is appreciated that function construction means and LUT construction means referred to throughout the present specification may be formed as a single unit, e.g. as a computer program which, for each point, computes the function at each point and then stores the point in a LUT "on the fly" before continuing to the next point.

As a result of the foregoing technique, an input of any particular input material to the DECSS will produce DECSS outputs with substantially identical CMYK values as those produced on the existing ECSS from the same input material.

Figure 1B illustrates the reproduction of input material using the existing ECSS 114 as opposed to the calibrated DECSS 116. The DECSS 116 scans the input 128, resulting in a first digital representation 130 thereof, which is then converted by the LUT 126 into a second digital representation 132 thereof, representing the required amounts of each colorant. It is seen that the digital representation 134 of the image 128 resulting from scanning by the ECSS 114 will normally be substantially identical to the output 132, as scanned by the DECSS 116.

Color values of the first digital representation which do not appear in the LUT 126 may be interpolated therefrom, using standard methods, such as those disclosed in chapter 2 of J. Stoer, Introduction to Numerical Analysis, Springer-Verlag, New York, 1980.

It is appreciated that the same or similar interpolation methods may be used in all of the applications of the present invention shown and described subsequently. The interpolation methods are preferably carried out automatically by suitable hardware, such as that commercially available from Zoran Corporation, Santa Clara, CA, USA, or from INMOS Limited, Bristol, UK.

In accordance with the embodiment of Fig. 1A, the ECSS 114 output of color values 118, corresponding to the color patches 112, can be stored as a digital file and can be transmitted to function construction means 122 by any suitable technique, such as via a cable connection, or by employing magnetic tape or other medium.

The above-described technique is not limited to automatic reading of colorant values. These values may be manually read one by one from the scanner. The operator may then input into the function construction means 122, as via a keyboard or via any other suitable input means, a list of RGB values and corresponding colorant values. A suitable software program may then be activated that will create the color calibration function and a look up table (if desired). The LUT may be stored in the memory of the DECSS.

Reference is now made to Fig. 2A which is a schematic illustration of calibration procedures for producing a first printing system output substantially identical to the output from a second printing system.

The embodiment of Fig. 2A is particularly useful in calibrating a proofing machine, used to prepare a single copy of a reproduction for preliminary proofing purposes, to emulate a printing machine which it is intended to use to produce the final reproduction. The state of the art technology, such as the Cromalin (registered trademark) system available from DuPont (U.K) Limited, Hertfordshire, UK, produces a reproduction which may differ substantially from the output of the printing machine that the proofing system is intended to emulate. Consequently, the proof must be evaluated by an expert who can judge the quality thereof while attempting to mentally adjust for the expected discrepancies between proof and eventual printed reproduction. The present invention enables the proofing machine to be accurately and algorithmically calibrated so as to emulate the printing machine.

Since there may exist colors that can be printed by the final printing machine but cannot be printed by the proofing machine using any combination of colorants, it is desirable to choose a proofing machine that is compatible with the printing machine. For example, the Cromalin (registered trade mark) proofing system available from DuPont is generally compatible with offset printing machines. Otherwise, "unprintable" colors may be dealt with using any suitable technique, such as the techniques described in the above-referenced article by Stone et al (particularly pages 275-279 thereof), the disclosure of which is incorporated herein by reference.

A further application is when a printing machine needs to be replaced or when it is desired to add an additional printing machine to an existing workshop. Since the new machine may be of a different brand, type or model than the old machine, it is typically found that printing with the same colorant values on the new machine will produce a color with a different appearance. Therefore, it is generally the case that the new printing machine must be adjusted manually, by a trial and error process, until the reproductions obtained therefrom roughly resemble the reproductions obtained from the existing machine. It is typically impossible to obtain complete concordance between the appearances of the reproductions produced by the first and second machines.

The different appearances obtained from different printing or proofing machines may be the result of at least the following reasons: different colorant materials employed, different technologies employed (offset, gravure, web, Cromalin (registered trade-mark), ink-jet, heat transfer, etc.), dot shape of half-tone film or plates, room temperature, humidity, etc.

Comparison of the results from the respective printing devices is preferably carried out in a CIE (Commission International d'Eclairage) standard color space but may also be carried out in any other suitable color space.

A preferred procedure for using a graphic arts reproduction system comprising a first printing device as a reference in order to calibrate a graphic arts reproduction system comprising a second printing device is the following, described with reference to Fig. 2A:

a. Provide a first database 210 and a second database 212 for the first and second printing devices 214 and 216 respectively. The two databases comprise first and second pluralities of colorant values, preferably CMYK values. Preferably, databases 210 and 212 are "good" databases for sampling the operations of output devices 214 and 216 respectively, in the sense that, once printed by printers 214 and 216 respectively and scanned by the scanner 222, each database has a predetermined pattern such as a pattern in which there is a minimum density of data in every area of interest. The predetermined pattern may, for example, be a generally even distribution throughout generally the entirety of the physically producible color space, if it is desired to sample generally the entirety of the color space.

The two databases are constructed in accordance with the database provision method shown and described hereinabove. When constructing database 210, using the database provision method of Fig. 7, the printer 214 should be used. When constructing database 212, the printer 216 should be used. Preferably, the pluralities of colorant values 210 and 212 include only colorant values that are actually used in reproduction tasks, by printers 214 and 216 respectively.

b. Databases 210 and 212 are printed by printing devices 214 and 216 respectively. The resulting images 218 and 220 respectively are scanned by a color reading device 222 such as the Smart Scanner available from Scitex. The digital representations of images 218 and 220 respectively resulting from the scanning thereof are referenced as 224 and 226. Digital representations 224 and 226 each comprise a plurality of color values, such as RGB values. In some applications it may be desirable to convert the pluralities of RGB values 224 and 226 to corresponding pluralities of CIE XYZ values or values from another suitable coordinate system, using known techniques.

c. Function construction means 228 receives pluralities of corresponding color values 212 and 226 and constructs a color calibration function f_1 from 226 to 212. Function construction means 228 is con-

structured and operative in accordance with the color calibration function computation procedure shown and described hereinabove. The color calibration function f_1 computed by function construction means 228 is stored in storage means 230 and represents the amounts of cyan, magenta, yellow and black inks required to print, using printing device 216, a color to be read as a given RGB value by color reading device 222. Implementations of function construction means 228 and of the storage of the resultant function f_1 as a LUT are disclosed in Appendices A and B.

d. Function f_1 is operated on the RGB_2 values of representation 224, resulting in a plurality 232 of CMYK values. For each CMYK value of database 212, the corresponding C'M'Y'K' value in digital representation 232 represents the amounts of the colorants required to produce, by means of printer 216, a colored location which would be read by color reading device 222 as a value substantially equal to the corresponding RGB value in digital representation 224.

e. Function construction means 228 is also operative to receive pluralities of color values 210 and 232 and to compute a color calibration function from the color values 210 to the color values 232. The color calibration function from digital file 210 to digital file 232 is received by LUT construction means 234 and used to construct and store a LUT 236.

LUT 236 therefore represents the conversions of the amounts of cyan, magenta, yellow and black inks required to print using printing device 216, such that the output will appear to the color reading device 222 to be substantially identical to the RGB values read from the unconverted values of c, m, y and k printed by printing device 214.

According to a preferred embodiment, steps (c) through (e) may be performed twice, once exactly as above and once wherein digital representations 210 and 224 replace digital representations 212 and 226 respectively in step (c) and digital representation 226 replaces digital representation 224 in step (d). The resulting plurality of CMYK values will have twice as many values as it did in the previous embodiment, thereby enhancing the accuracy of LUT 236.

According to a first preferred embodiment, when scanning image representations 218 and 220, the white point is selected to be as close as possible to the white-point CMY values of the corresponding printers 214 and 216 respectively. If the selected white point cannot coincide exactly with the corresponding white-point CMY value, a slightly higher white point is typically selected. All other controls are put on their default setting.

According to an alternative preferred embodiment, the white-point is taken on a blank portion of the white paper or background. All other controls are put on their default setting.

It is appreciated that the most appropriate selection of the white point may vary as a function of the particular application and of the particular graphic arts reproduction system employed.

Preferably, colored image representations 218 and 220 are each automatically scanned, thereby to define a plurality of color values corresponding to a plurality of colored locations into which each image is divided. Any suitable procedure may be employed to accomplish this, which procedure may comprise the steps of: automatically passing from pixel to pixel of the colored image while reading and storing the color values of each pixel, defining a plurality of colored locations each comprising a plurality of pixels, and averaging or otherwise combining the values of at least some of the pixels in each colored location, thereby to define a color value for each colored location. A software implementation of a procedure for automatically scanning an analog representation of a colored image is disclosed in Appendix B.

Once constructed, LUT 236 may be utilized in at least two different ways:

(i) If it is desired to print, on printer 216, an image represented as a digital file originally intended for printing by printer 214 so that its appearance to the color reading device 222 will be substantially as when the digital file is printed on printer 214, the digital file is passed through LUT 236 and the resulting transformed digital file is printed on printer 216. The results of printing the digital file on printer 214 and subsequently reading it using color reading device 222 are substantially identical to the results that would be obtained by printing the transformed file on printer 216 and subsequently reading it using color reading device.

(ii) Reference is made to Fig. 2B which illustrates modification of an RGB-to-CMYK LUT 260 incorporated in a color reading device 223 such as a scanner. LUT 260 is suitable for use in conjunction with printing device 214. It is desired to modify LUT 260 and thereby to obtain a modified RGB-to-CMYK LUT 262 which, when loaded onto scanner 223 and used in conjunction with printing device 216 will result in pictures substantially identical to those produced by scanner 223 loaded with LUT 260 and printing device 214, where the term "substantially identical" implies that pictures produced by the two processes will be "seen" as substantially identical by a scanner.

As shown in Fig. 2B, LUT 236 is operated on the values of LUT 260, transforming each CMYK value intended for printer 214 to a CMYK value suitable for printer 216, thereby to obtain LUT 262. Consequently,

the result 264 of scanning a particular image 265 using scanner 222 loaded with LUT 260 and subsequently printing with printer 214 are substantially the same as the result 266 of scanning the image using scanner 222 loaded with LUT 262 and subsequently printing with printer 216. This implies that a scanned representation of picture 264 will comprise generally the same values as a scanned representation, using the same scanner, of picture 266.

Reference is now made to Fig. 8 which illustrates an alternative embodiment of the output to output calibration.

A digital representation 710 of an image, typically in the CMY color coordinate system but alternatively, in any N-dimensional color coordinate system, is sought to be produced by at least two color reproduction systems, typically a proofer 712 and a printer 714, such that digital representations 720 and 722 of analog representations 716 and 718, respectively, are generally identical. Digital representation 710 is analogous to databases 210 and 212 of Fig. 2A and digital representations 720 and 722 are analogous to digital representations 224 and 226 of Fig. 2A.

Digital representations 720 and 722 are typically produced by a colorimeter or other color measuring system, and are typically in a colorimetric color coordinate system, such as XYZ or L*a*b*, or any other measurable N-dimensional color coordinate system. Typically, the three dimensions are the CIE defined coordinate system, such as XYZ or L*a*b*, and the remaining dimensions are any which may be desired to be measured, such as non-colorimetric effects seen by a human observer. One such dimension P might be the shininess of each color, or P might be derived from CMYK values using a formula such as:

$$P = K - (C + M + Y)/3 \quad (1)$$

Formula 1 gives an indication of the amount of black used to produce a given color.

Figs. 8 - 11 illustrating this embodiment indicate that the digital representations are in the CMY and XYZ color coordinate systems. It will be appreciated that the present invention is operative for N-dimensional transformations and that the notation CMY and XYZ is by way of explanation only.

It is known in the art that the two reproduction systems, when input an identical digital representation 710, will generally produce somewhat different analog representations 716 and 718. Since it is generally desired to match the output of one color reproduction system, defined here as the proofer 712, to the output of the other reproduction system, defined here as the printer 714, a color transformation 724 between the CMY color coordinate system of the digital representation 710 to the CMY color coordinate system of the proofer 712 is necessary.

The color transformation 724 typically takes as input an N-dimensional transformation lookup table 742 relating the printable coordinate system of the input digital representation 710 with the printable coordinate system of the proofer 712.

Transformation lookup table 742 can be produced according to the function construction method described hereinabove or, alternatively, in accordance with an alternative function construction method as described hereinbelow with respect to Figs. 9 - 11.

Reference is now made to Fig. 9 which illustrates apparatus for performing the alternative method. An N-dimensional color conversion table 730 is built for the printer 714 which converts between a first input digital representation, typically in CMY, CMYK or any N-dimensional printable color coordinate system, and digital representation 722 of the output analog representation 718, in a measurable color coordinate system, such as XYZ or XYZP. Typically but not necessarily, the number of input dimensions is equivalent to the number of output dimensions. Typically the first input digital representation comprises a "good" database, as described hereinabove.

The conversion table 730 is built as follows: the first input digital representation is sent to printer 714 to be printed. The resultant analog representation 718 is measured, via colorimeters or other measurement devices, and the color value of each printed color is stored in conversion table 730 opposite the input digital value which produced it. The precise details of the production of table 730 are given in the manual for the TRANS/4 color converter, manufactured by Scitex Corporation Ltd. of Herzliya, Israel, incorporated herein by reference and set forth in Appendix E. Alternatively, the conversion table 730 can be produced according to the function construction method described hereinabove.

The first input digital representation typically is organized on a N-dimensional grid.

In accordance with the present invention, an N-dimensional conversion table 732 is built for proofer 712 which converts between a second input digital representation, which can be different from the first input digital representation and typically is in a CMY or CMYK or any N-dimensional printable color coordinate system, and a digital representation of an output analog representation produced without the color transformation 724, in a measurable color coordinate system, such as XYZ. The conversion table 732 is

built as described hereinabove for conversion table 730. The conversion table 732 is not necessarily built using the same grid as that of table 730. It can be built from any grid or from no grid. Its CMY values can be different from the CMY values used to produce conversion table 30 or they can be identical. Typically but not necessarily, the number of input dimensions is equivalent to the number of output dimensions.

5 Conversion tables 730 and 732 are input into a printer-to-proofer transformer 734, described in more detail hereinbelow with reference to Fig. 10, for transforming a plurality of printer CMY values to a plurality of proofer CMY values where the XYZ values of the proofer CMY values are generally close to the XYZ values of the printer CMY values. An XYZ value of a CMY value is defined as the XYZ measured from the color produced by the color reproduction system when the CMY value is input to it.

10 It will be appreciated that the output proofer CMY value does not necessarily appear in conversion table 732.

Printer-to-proofer transformer 734 can be utilized for producing a transformation table 736 of proofer CMY values for each of the printer CMY values of conversion table 730, or, alternatively as shown by a dotted arrow, for producing a proofer CMY value upon input of a printer CMY value. Transformation table 15 736 is on the same grid as conversion table 730.

Transformation table 736 can optionally be stored in a color converter 744, such as the TRANS/4 color converter, for converting a printer CMY value to a proofer CMY value in accordance with table 736. For any printer CMY value not found in table 736, a linear interpolation is performed on table 736 in order to produce the output proofer CMY value.

20 Alternatively, the transformation table 736 can be input to an optional editor 738 for editing table 736. Editor 738 can be any kind of editor or text processor and is operative to allow an operator to manually correct the table 736, if necessary.

For example, in a CMY color coordinate system using a 'percent (%) dot' scale indicating the percentage of each ink to be used to produce the color, white is denoted by (0,0,0). When the white of the 25 printer 714 is darker than the white of proofer 712, transformer 734 typically produces a proofer CMY white value greater than (0,0,0). This typically produces undesired effects such as the existence of screen dots in the analog output of the proofer 712 where none exist in the analog output of the printer 714.

The above undesired effects can be eliminated by editing table 736, via editor 738, to put a (0,0,0) proofer CMY value for a (0,0,0) printer CMY value. However, it will be appreciated that this produces an 30 incorrect colorimetric (XYZ) value for the white produced by proofer 712.

The output of optional editor 738, an edited table 736, or, in the absence of editor 738, a non-edited table 736, is input to a non-linear interpolator 740 for non-linearly interpolating table 736 thereby to produce transformation table 742 which is denser than transformation table 736. The operation of interpolator 740 is described in more detail hereinbelow with reference to Fig. 11.

35 Transformation table 742 is an N-dimensional CMY-CMY lookup table which is then stored in color converter 744. For any printer CMY value not found in table 736, a linear interpolation is performed on table 742 in order to produce the output proofer CMY value. It will be appreciated that the linearly interpolated value produced from table 742 is generally more accurate than the linearly interpolated value produced from table 736 since table 742 is denser than table 736.

40 It will be appreciated that, alternatively, color converter 744 can perform a non-linear interpolation from table 736. The present invention does not illustrate this alternative since cost and speed considerations using current computer technology indicate that the above method is presently more desirable.

Transformation table 742 can be used, as is, or it can be made more accurate as follows:

45 1) Color transformation apparatus 724 utilizes transformation table 742 on the CMY data listed in table 732 to print analog representation 716 whose colorimetric values are subsequently measured.

2) A new conversion table is produced which is then concatenated to conversion table 732 to produce a new version of conversion table 732.

3) The method of Figs. 9 - 11 is repeated, using the new version of conversion table 732.

Steps 1 - 3 can be repeated any number of times to produce an accurate transformation table 742.

50 Reference is now made to Fig. 10 which details, in flow chart format, the operation of printer-to-proofer transformer 734.

For each entry in the printer conversion table 730, the operation involves searching the proofer conversion table 732 for entries whose XYZ value is near, by some definition, to the printer XYZ value. The results are stored in a table of close values. This is shown in steps 750 - 764 of Fig. 10.

55 Specifically, step 754 requires the initialization of the table of close values. This may take the form of defining a closeness threshold less than which indicates closeness, or it may take the form of a maximum number of close values allowed.

In the second case, as the proofer table 732 is searched, the closest values found, and their distances,

are stored. If a closer one is found, the furthest of the stored values is released and the closer one kept. Thus, in step 754, the distances for the initial close values are set to high numbers.

In step 758, the distance between the printer XYZ value and the present proofer XYZ value is calculated, typically as the Euclidean distance. Other suitable distance measures can alternatively be used.

Typically, combinations of the close proofer values found in step 762 are then utilized for the next set of calculations. Combinations must minimally be of one more than the dimension size of the input digital representations. Thus, if the digital representations are in CMY, then there will minimally be four proofer values in each combination. The number of elements in the combination can be predetermined by the operator.

The distance between the printer XYZ value and the combination of proofer XYZ values is calculated as a combination of two elements. The first is the sum of the distances between the individual proofer XYZ values and the printer XYZ value.

The second is an "insideness" measure defining whether or not the printer XYZ value falls within the constellation of proofer XYZ values and can be calculated in a number of ways. For example, a set of linear equations can be solved where equations 2 - 5 below are an exemplary set for use with a combination containing four proofer points:

$$P_x = F_{x1}m_1 + F_{x2}m_2 + F_{x3}m_3 + F_{x4}m_4 \quad (2)$$

$$P_y = F_{y1}m_1 + F_{y2}m_2 + F_{y3}m_3 + F_{y4}m_4 \quad (3)$$

$$P_z = F_{z1}m_1 + F_{z2}m_2 + F_{z3}m_3 + F_{z4}m_4 \quad (4)$$

$$1.0 = m_1 + m_2 + m_3 + m_4 \quad (5)$$

where the m_i are unknown values, P_j indicates the printer X, Y or Z values and F_j indicates the proofer X, Y or Z values.

If the printer XYZ value falls inside the proofer XYZ values, indicated by all positive m_i , the insideness measure is given a small positive value. Otherwise, the insideness measure is defined as the absolute value of the sum of the negative m_i .

The distance between the printer XYZ value and the proofer XYZ values is defined as the combination of the insideness measure and the distance sum, where the combination is typically by multiplication but can be by any other suitable operation.

For all proofer XYZ combinations close to the printer XYZ, the steps 772 - 776 are performed.

Weights are calculated such that the weighted vector sum of the proofer XYZ combination is the printer XYZ. In other words, the printer XYZ is at the 'center of mass' of the proofer XYZ combination. This is calculated in step 772 and involves the solution of a linear set of equations, such as equations 2 - 5.

A preliminary proofer CMY value is then calculated in step 774. Specifically, a weighted vector addition of the proofer CMY values of this combination, found in table 732, is performed using the weights calculated in step 772.

In step 776, the preliminary proofer CMY value of step 774 is assigned a weight which is a function of the distance of the combination to the printer XYZ value as calculated in step 768. Typically, the weight assigned is the distance between the combination and the printer XYZ value divided by the sum of these distances over all combinations close to the printer XYZ value.

The output proofer CMY value which produces a generally identical XYZ value as the printer XYZ value is calculated in step 780 as the weighted sum of all the preliminary proofer CMY values where the weights are those assigned in step 776.

It will be appreciated that alternatively, it is possible to select only the closest proofer combination, calculate its CMY value and use that value as the output proofer CMY value.

Table 736 is a lookup table with the printer CMY value vs. the output proofer CMY value calculated in step 780.

Reference is now made to Fig. 11 which details the non-linear interpolation method of interpolator 740.

A non-linear function, such as a tensor of splines, which defines the relationship between printer CMY values and proofer CMY values is fit to optionally edited conversion table 736 in step 794. Tensors of splines are described in detail in chapter 17 of A Practical Guide to Splines, by Carl De Boor, Vol. 27 of the Applied Mathematical Sciences series published by Springer Verlag, New York, 1978, which is incorporated herein by reference. A further reference is An Introduction to Splines for use in Computer Graphics and Geometric Modeling, by Richard H. Bartels et al., published by Morgan Kaufmann Publishers, Inc., Los

Altos, California, 1987.

Once the number and placement of printer CMY values in transformation table 742 are defined, typically via the operator and typically on a grid used by color converter 744, the non-linear function is used to calculate the proofer CMY value for each printer CMY value in table 742. In this manner, table 742 is produced.

Object code for implementing the operations of transformer 734 and interpolator 740, shown in the flow charts of Figs. 10 and 11, are set forth in Appendices F and G, respectively. Exemplary source code indicating how to interface with the object codes of Appendices F and G is set forth in Appendix H along with instructions as to how to use the source code.

Reference is now made to Fig. 12 which illustrates an integrated system for reading and writing an image, suitable for performing the output to output calibration procedures of Figs. 2A, 2B and 8 - 11. Thus, the system is capable of producing the conversion tables 736 and/or 742 of Fig. 9 and LUTs 236, 260 and 262 of Figs. 2A and 2B.

The system comprises a color proofer 800, for writing an analog representation of an image from a digital representation and a color reading system 802, such as a colorimeter or a spectrophotometer, for creating a digital representation of an image from an analog representation. The color reading system 802 is typically directly connected to the color reproduction system 800. A digital data processor 830 controls the operations of both the color proofer 800 and the color reading system 802.

As is known in the art, color proofer 800 typically comprises a translation system comprising a drum 804 for rotating a substrate 805, such as a piece of paper, upon which will be printed the analog representation of the image, and a translating carriage 807 which moves in one direction as the drum 804 rotates. Onto the translating carriage 807 are attached nozzles 806 for receiving inks in accordance with the digital representation of the image and for effecting the printing of the analog representation of the image onto the substrate 805. A controller 808 simultaneously controls nozzles 806 and the movement of drum 804 and translating carriage 807 in accordance with the digital representation of the image received from data processor 830. Controller 808 also reports information regarding the status of proofer 800 to processor 830.

Any suitable color proofer 800 can be used. An example of which is the Iris color proofer, model 3024, manufactured by Iris Graphics Inc. of Massachusetts, USA.

As is known in the art, color reading system 802 typically comprises a reading head 820, such as a spectrophotometric head, for reading the colors of an analog representation and for producing from them a digital representation of the analog representation and a color reading processor 822 for controlling the operation of the reading head 820 and for receiving its output. Reading head 820 typically comprises a light source and a light detector coupled via an optical system. The elements of the reading head 820 are not shown since they are known in the art. Processor 822 is digitally connected to processor 830 from which it receives instructions and to whom it provides data.

Any suitable color reading system 802 may be used. An example color reading system is the Gretag SPM-700 manufactured by Gretag Ltd. of Regensdorf, Switzerland.

In accordance with the present invention, the reading head 820 is fixed to the translating carriage 807 of the color proofer 800. This physical connection 803 is noted in Fig. 12 by a curved line. The analog representation to be read is placed on drum 804 and reading is effected during the simultaneous rotation of the drum 804 and translation of carriage 807. Preferably, during the reading operation, nozzle 806 is not activated and thus, no writing is performed.

It will be appreciated that the placement of the reading head 820 onto the translating carriage 807 enables reading and writing to be performed in one machine.

Data processor 830 typically comprises a processor 832 for receiving data from color reading system 802 and for transmitting instructions to controller 808 and a processing unit 834 for controlling processor 832. Processing unit 834 is operative to match the output of a second color reproduction system to the output of color proofer 800 as described hereinabove with reference to Figs. 2A, 2B and 8 - 11 and to this end, it controls which operation, the reading or the writing operation, will occur at a given moment.

Processor 832 is typically the processor provided with the color proofer 800, such as the processor provided with the Iris color proofer model 3024 and processing unit 834 is typically a workstation, such as the Whisper workstation manufactured by Scitex Corporation Ltd. of Herzliya, Israel.

The operation of the system of Fig. 12 will now be described with reference to the operations of Figs. 8 - 11, it being understood that the system of Fig. 12 is operative also to perform the operations of Figs. 2A and 2B. Similar reference numerals are used to refer to similar elements:

1) Analog representation 718 from the second color reproduction system (i.e. printer 714) is placed on drum 804 and its color values are read by reading head 820, thereby producing digital representation

722 which is stored in processing unit 834.

2) Analog representation 716 is produced by color proofer 800 using digital representation 710, the representation used to produce analog representation 718.

3) Analog representation 716 remains on drum 804 and its color values are read by reading head 820, thereby producing digital representation 720.

4) Processing unit 834 first produces color conversion tables 730 and 732 from representations 716, 718, 720 and 722 and from them produces the transformation table 742.

Application #3 Duplication of Originals

Reference is now made to the schematic illustrations of Figs. 3A and 3B, which illustrate an embodiment of the invention useful in producing duplications of images existing as hard copies on a particular medium (such as but not limited to a transparency or reflective copy). It is noted that a half-toned printed picture can be duplicated entirely analogously to what will be described herein, except that the picture may be de-screened, using conventional techniques (such as those described in Marquet, M., "Dehalftoning of negatives by optical filtering," *Optica Acta* 6, 404-405, 1959; Marquet, M and J. Tsujituchi, "Interpretation of Particular Aspects of Dehalftoned Images," *Optica Acta* 8, 267-277, 1961; and Kermisch, D. and P.G. Roetling, "Fourier Spectra of Halftone Screens", *J. Opt. Soc. Amer.* 65, 716-723, 1975, the disclosure of which is incorporated herein by reference).

A preferred method for providing for duplication of images represented on a given medium is as follows. Steps (a)-(d) are illustrated in Fig. 3A. Step (e) comprises two alternative methods for duplicating a given image once steps (a) - (d) have been carried out, illustrated in Figs. 3B and 3C respectively.

a. Provide a first digital representation 310 of a colored image, typically comprising a first plurality of RGB values, using the database provision method shown and described hereinabove. Here a "good" database 310 is one which is suitable for sampling the operation of recorder 312 used in conjunction with recording medium 314 and scanner 316, as explained hereinabove in the section on database construction, and is preferably constructed in accordance with the method of Figs. 7A-7B. Therefore, when using the database provision method of Fig. 7A-7B to construct the database 310, the scanner 316 and the recorder 312 should be used for scanning and recording the initial database.

b. Place a substrate 314 of the desired medium in a color recorder 312 such as a 4cast available from DuPont. According to a preferred embodiment of the present invention, the medium of the substrate 314 is the same as the medium of the original 326 (Fig. 3B) which it is desired to duplicate. Load the color recording apparatus 312 with the digital file 310, thereby to provide an analog representation 315 corresponding to the digital representation 310 of the colored image.

c. Read the analog representation 315 using a color reading device 316 such as an analog ECSS or a DECSS, thereby to obtain a second digital representation 318 of the colored image, preferably comprising a second plurality of RGB values corresponding to the plurality 310 of RGB values.

d. Input digital representations 310 and 318 to function construction means 320, which is operative to construct a function from the plurality of color values 318 to the plurality of color values 310 in accordance with the color calibration function computation procedure described hereinabove. The color calibration function computed by function construction means 320 is received by LUT construction means 322. LUT construction means 322 is operative to construct a LUT 324 relating the RGB values 318 to the RGB values 310 and to store the LUT 324 in the TCR module of the scanner 316. The LUT 324 may now be used as follows:

e. Reference is made to Fig. 3B. Given a substrate 326 (preferably of the same medium as substrate 314) bearing an analog representation of a colored image 327, and when it is sought to duplicate the colored image 327 onto a second substrate 328 (preferably of the same medium as substrate 326), the image 327 is scanned by the scanner 316 whose TCR module contains the LUT 324, thereby to obtain a digital representation 330 of the colored image. The digital representation is then recorded by color recording apparatus 312, thereby to obtain a substantially accurate duplicate 332 of the original colored image 327 on substrate 328.

Alternatively, the colored image 327 may be reproduced as in Fig. 3C. As shown, the image 327 is scanned by the scanner 316 using only the color separation unit 334, thereby to define a digital representation 336, preferably comprising a plurality of RGB values, of image 327. The digital representation 336 is stored in storage means 338. The function constructed by function construction means 320 is stored in any suitable storage 340, such as the memory of a suitable computer, preferably in the form of a LUT. Function operation means 321 then operates the function on digital representation 336 which is read from storage means 338, thereby to provide a modified digital representation 330 of image 327. Digital

representation 330 is then recorded by color recording apparatus 312, thereby to obtain a substantially accurate duplicate 332 of the original colored image 327 on substrate 328.

If desired, certain of the above steps can be performed manually. Specifically, the RGB color values of the patches 314 may be manually measured with a color separation scanner and then manually input into function construction means 320, as by a keyboard, instead of being scanned.

According to an alternative embodiment, the image 327 on the substrate 326 is scanned itself to provide digital representation 310 (Fig. 3A). This embodiment is particularly useful in certain applications as it employs precisely those colors required for the duplication of the particular image 327.

10 Application #4: Reconstruction of Input from Output

Reference is now made to Figs. 4A- 4E, which illustrate a further embodiment of the present invention useful in reconstructing a hard copy produced using a given tone and color reproduction system.

Fig. 4A describes a standard reproduction process of an image on a transparency 412 which is printed as a reflective copy 430. If the original transparency 412 is unavailable, it can be reconstructed using either the processed digital file 424 or the reflective output 430.

Fig. 4B describes an application in which it is desired to create a single image comprising the tree in picture 412 and the sun in picture 414, and to represent it upon a single substrate, thereby to obtain a single representation 432 (such as a reflective copy) of both the sun and the tree. It may be desired to provide transparencies of the representation of the combined image in which the tree resembles the tree in the original picture 412 and the sun resembles the sun in the original picture 414. Preferably, the medium of the original picture 412 is substantially identical to the medium of the original picture 414.

A preferred method of reconstructing the input copy 412 assuming that LUT 422 and digital file 424 are still available is illustrated in Fig. 4C. First, LUT 422 is inverted, using known methods such as those disclosed on page 267 of the above referenced article by Stone et al, thereby to provide an inverted LUT 434. LUT 434 is then operated on digital file 424, thereby to provide a digital file 436, typically comprising a plurality of RGB values, which values are substantially identical to the plurality of RGB values 418 scanned from the input copy 412 (Fig. 4A). The remainder of the procedure consists of constructing a LUT 437 which, when operated on digital file 436, will result in a digital file 438 which when recorded on a substrate 440 (preferably of the same medium as the original 412) by a recorder 442, will result in an analog representation which has the following property: If scanned by scanner 416, analog representation 440 will provide a digital representation 442 substantially identical to digital file 436 (and digital file 418). Preferably, the analog representation also has the property of appearing to the human eye to have substantially the same tone and color as the original 412.

A preferred method of constructing a LUT 437 with at least the former property and typically both properties has been shown and described hereinabove with reference to Fig. 3A, in which the LUT with the desired properties is referenced as LUT 324.

A preferred method of reconstructing the input copy 412 from the output copy 430 when digital file 424 is not available, whereas the printed picture 430 of fig. 4A is available, is illustrated in Figs. 4D and 4E. As shown, the method comprises providing a database 444, which is preferably a "good" database for sampling the operation of printer 428 in conjunction with scanner 416 and which typically comprises a plurality of CMYK values. The database 444 is printed (e.g. as a reflective copy) by printer 428 and is subsequently scanned by scanner 416, thereby to provide a digital file 450. Alternatively, digital file 450 may be predetermined and database 444 may be constructed therefrom using the database construction method shown and described hereinabove with reference to Figs. 7A-7B. Function construction means 452 receives corresponding pluralities of color values 450 and 444 and constructs a color calibration function from RGB values 450 to CMYK values 444 and preferably stores it in the form of a LUT 454, all in accordance with the function construction procedure shown and described hereinabove.

As shown in Fig. 4E, output copy 430 is scanned by scanner 416 and the resulting digital file 456, typically comprising RGB values, is passed through LUT 454, thereby to provide a digital file 458 preferably comprising a plurality of CMYK values. The plurality 458 of CMYK values, when output by printer 428, will result in a hard copy 460 of the original image which is substantially identical to the hard copy 430. The digital file 458 is substantially identical to digital file 424 of Fig. 4A. Therefore, digital file 458 may be employed to restore the original transparency 412 using the procedure of Fig. 4C.

The color recording apparatus 442 may comprise any suitable color recording apparatus, such as the 4cast plotter available from DuPont.

The computations described hereinabove need not be carried out by the scanner but may alternatively be carried out by any suitable computation means, typically a standard computer such as an IBM PC, which

may communicate with the remainder of the apparatus using any suitable conventional communication method.

Application #5 Calibration of a first color separation scanner with reference to a second color separation scanner on a special setting

The following embodiment of the present invention is useful when it is desired to calibrate a scanner or other color reading device relative to a reference scanner/reading device on a special setting such as but not limited to GCR, UCR, UCA, etc. This embodiment is particularly useful if the operator is relatively unfamiliar with the special setting.

Reference is now made to Fig. 5A which illustrates an embodiment of the present invention useful in incorporating a new DECSS into an existing TCR system comprising a currently used ECSS (or DECSS) on a special setting.

It is appreciated that, by putting the currently used ECSS onto its special setting, a look up table can be constructed which will allow the new DECSS to emulate the existing TCR system, by using the method of Figs. 1A and 1B shown and described hereinabove. However, normally, an unmodified implementation of the look up table is undesirable since operators generally find it difficult to perceive and interpret the special setting CMYK values in the course of subsequent operator controlled tone and color adjustment. Therefore, it is preferable to initially scan the image with a scanner loaded with a "regular" LUT in order to enable the operator to carry out the desired tone and color modifications. Once the modifications have been completed, the modified color values may be converted to the special setting values, thereby to implement the calibration of the scanner to be calibrated with reference to the special setting of the reference scanner.

A preferred procedure for calibrating a first color scanner with reference to a second color scanner on a special setting comprises the following steps:

a. The existing scanner 510 is put onto its normal setting N and an analog representation 512 of a colored image comprising a plurality of colored locations 514 is scanned, thereby to obtain a digital representation 516 comprising a plurality of color values, typically CMYK values, corresponding to the plurality of colored locations 514.

The colored image 512 is preferably a "good" database constructed in accordance with the database provision method shown and described hereinabove. Here a "good" database 512 is one whose values are as close as desired to a "target" predetermined plurality of color values. For example, database 512 may comprise a database which is so constructed that it samples the operation of scanner 510 on its special setting in the subrange in which use of a special rather than normal setting makes a substantial difference. Construction of such a database is explained hereinabove in connection with the database construction method of Figs. 7A-7B.

b. The existing scanner 510 is put onto the desired special setting S and the same colored image is scanned, thereby to obtain a digital representation 518 comprising a plurality of color values, typically CMYK values, corresponding to the plurality of colored locations 514.

c. Digital representations 516 and 518 are input to function construction means 520, which is operative to construct a function from the plurality of color values 516 to the plurality of color values 518 in accordance with the color calibration function computation procedure shown and described hereinabove. The color calibration function computed by function construction means 520 is received by LUT construction means 522. LUT construction means 522 is operative to construct a LUT 524 relating the CMYK values 518 to the CMYK values 516 and to store the LUT 524 in the TCR module of the scanner 510. Implementations of means for constructing a function and storing it as a LUT "on the fly" are disclosed in Appendices A and B.

d. When it is desired to use the new DECSS 526 to scan an input copy 528, the input 528 is scanned with the scanner 526, thereby to obtain a digital representation 530 of the input 528. The RGB (typically) values of digital representation 530 are typically converted using the standard LUT 126 of Fig. 1A, resulting in a second digital representation 532 of input 528, preferably comprising a plurality of CMYK values which are "standard" in that they are familiar to a human operator accustomed to working on a normal setting and thus easily modifiable by the operator.

e. Desired tone and color manipulations may be carried out by a human operator, typically on LUT 126, resulting in modifications of digital representation 532 in subsequent versions thereof.

f. Once the operator has completed the step of manipulating tone and color, LUT 524 is employed to convert each of the normal setting CMYK values of the digital representation 532 to the corresponding special setting CMYK values, resulting in a final digital representation 536 of the input 528, which is substantially identical to the digital representation of input 528 which would result by scanning input 528

with scanner 510 on its special setting and performing the same operator-input tone and color manipulations.

Alternatively, as shown in Fig. 5B, following the execution of tone and color modifications by the operator, the CMYK values of LUT 126 may be converted, thereby to define a converted LUT 538, by using the conversion stored in LUT 524 or by operating the function constructed by function construction means 520 on LUT 126. LUT 538 may be stored in the TCR module of the scanner 526. Digital representation 530 may then be directly converted by LUT 538, preferably on the fly, to provide the final digital representation 536.

It is noted that here as throughout the present specification, the color calibration function whose construction is described hereinabove may be stored in the memory of any suitable commercially available computing means, such as the IBM PC.

Application #6: Calibration of a color monitor display with reference to output apparatus

Reference is now made to Fig. 6 which is a schematic illustration of a method for calibration of a CRT with reference to output apparatus. The objective is to provide an analog representation 610, on a CRT display 616, of a colored image, which representation resembles a hard copy representation 612 of the colored image output from a printing device 214. It may be appreciated that the present method and apparatus are generally similar to the method and apparatus of Fig. 2, where a printing device 216 (rather than a CRT) is calibrated with reference to output apparatus 214. Identical reference numerals are employed to reference identical elements in Figs. 2 and 6 to facilitate understanding of the similarity. The distinguishing elements of the method and apparatus of Fig. 6 will now be discussed.

As shown in Fig. 6, an optical interface 620 is required to enable scanner 222 to receive input from CRT 616. The particular interface required varies according to the scanner 222. For example, the Scitex Smart Scanner may be optically coupled to the screen of the monitor 616 by mechanically disconnecting and removing the color separation head of the scanner from the interior of the scanner while maintaining the electrical wiring connections and placing the head in front of the monitor. Also, the RGB values 210 are preferably displayed one after the other on the CRT screen 616 and are received one at a time by the scanner 222. Synchronization of the scanner with the monitor is required. This procedure is provided on the Smart Scanner available from Scitex.

As in Application #2, it may be desirable to convert pluralities of RGB values 224 and 226 to XYZ values or values from any other suitable coordinate system, using conventional apparatus and techniques, such as those described in P.G. Engeldrum, "Almost Color Mixture Functions", Journal of Imaging Technology, 14(4), August 1988, and in references 2 and 5-7 cited therein. The disclosures of this article and of all references cited therein are incorporated herein by reference. Also, it is appreciated that any suitable color reading device may replace the scanner 222.

If desired, RGB values 226 may be read in CMC form by optical interface 620. The filter arrangement of the normally used color separation head of the Smart Scanner may be replaced by a CMC filter arrangement which emulates the human eye. CMC filter arrangements and methods for constructing them are described in the above referenced article entitled "Almost color mixture functions" as well as in references 2, 5 and 6 thereof. Preferably, the illumination of analog representations 610 and 612 should be such that their respective white areas will be of substantially the same brightness.

Application 7: Calibration of an Input Device to an Image Processing Device

Image creation and processing systems may be used to merge or combine more than one color image into a single color image and/or to modify input color images. For example, it may be desired to create a color image comprising a first portion obtained by photographic techniques and subsequently read into the image processing system, preferably using conventional scanning techniques, and a second portion generated by the graphic software of the image processing system. Alternatively or in addition, it may be desired to use the graphic software of the image processing system to modify a digital representation of a photographic image or of any other color image generated externally of the image processing system.

Unfortunately, the coordinates used to define internally generated images, denoted here as creation system coordinates, are typically different than those used to define externally generated images, denoted here as scanner coordinates. For example, a RGB color value (0,0,10) in scanner coordinates might result in a first input color blue while producing an output of a second color blue in creation system coordinates. However, when combining internally and externally generated images, or when modifying an externally generated image within the graphic software, it is desired to match the two coordinate systems such that

the RGB color value (0,0,10) represents the same color for the scanner input and the image processing unit.

A preferred method and apparatus for achieving one or both of the above objectives is shown and described herein. The apparatus and method shown and described herein have the particular advantage of automatically and generally without resorting to human judgement providing an output from the image processing system which generally resembles the input thereto, apart from the modifications or merge operations performed on the input by the image processing system. In this context, two analog representations resemble one another if a color reading device reading both representations will output substantially the same digital representation for both analog representations.

Reference is now made to Fig. 13 which illustrates calibration of an image processing system comprising a color reading device 932, such as a scanner, means for modifying a digital representation of a color image, such as graphic software 954 (Fig. 14), and a color output device 926, such as a plotter or other color output apparatus. The calibration enables an image read by the scanner 932 to be processed and to be subsequently output by the plotter 926, substantially without causing distortion of the representation of the color image input to the scanner 932, except for the intentional modifications performed thereupon by the image processing system.

As seen in Fig. 13, a digital database 922 is input to, generated in, read from an analog image, or otherwise made available to an image processing unit 924. The digital database 922 generally comprises a plurality of digital color values, defined in the color coordinate system of image processing unit 924.

The database 922 typically comprises a digital file which may be generated by any suitable means, such as via graphic software, or alternatively may be input into the image processing system by any suitable communication method, such as via magnetic tape. Database 922 is output by color output apparatus 926, such as a 4cast plotter, commercially available from DuPont, on any suitable substrate 928, such as a transparency, thereby to provide an analog representation 930 corresponding to the digital representation 922 of the database. Preferably the substrate 928 should be of the same medium as the substrate which it is desired to use to bear the analog images 950 which it is intended to process (Fig. 14). By 'same medium' it is meant the same product. Thus, if it is intended to process using ektachrome substrates produced by Kodak Corporation of the USA, then ektachrome substrates are preferably used for substrate 928.

Analog representation 930 is read by color reading device 932, which may comprise any suitable device such as the Smart Scanner, commercially available from Scitex Corporation, Herzlia, Israel. Scanner 932 produces a digital representation 934 whose color values are defined in the coordinate system of scanner 932.

Digital representation 934 of the database and the original digital representation 922 of the database are both then input into transformation construction apparatus 936. Transformation construction apparatus 936 is operative to construct a transformation from the digital representation 934 to the digital representation 922 and to output this transformation in any suitable form. The transformation is, effectively, a transformation from the color coordinate system of the scanner 932 to that of the image processing unit 924 combined with the output device 926.

Preferably, the transformation is output and stored as a LookUp Table (LUT) 938. The LUT 938 may subsequently be loaded onto scanner 932 or onto suitable computing means, such as an IBM PC or a suitable module that may exist in the image processing unit 924, and may then be used as described hereinbelow with reference to Fig. 14.

Transformation construction apparatus 936 is preferably constructed and operative as described hereinabove.

The plurality of digital color values of database 922 typically represents the color space in which the operator of the image processing apparatus works. It typically has a predetermined pattern, typically comprising patches of color, which typically has at least a minimum density of data (digital color values) in every location of interest. The predetermined pattern may, for example, be a generally even distribution throughout generally the entirety of the producible color space. If certain volumes of the color space are more important to the operator, then the operator may define more color patches in that volume to allow a more accurate representation of the volume.

Specifically, the operator may produce his desired database 922 as follows:

1. An initial database of patches is produced wherein the colors of the patches have a subset of possible three dimensional eight bit digital color values, where a typical subset is defined as the following combinations of Red (R), Green (G) and Blue (B):

$$\begin{aligned} R &= n*50 \\ G &= m*50 \end{aligned}$$

$$B = p \cdot 50 \quad (6)$$

where n, m and p are the entirety of integer values between 0 and 5, inclusive. This produces 216 patches.

2. The initial database is output, to a substrate such as film, by the output device 926, thereby producing an analog output.

3. The operator visually selects on the analog output those patches of the initial database that are included in the color space volume that he wishes to be more accurately represented in his desired database 922 and indicates his selections to image processing unit 924. For example, one selected patch might be the patch that was created by:

$$R = 50, G = 100, B = 150.$$

4. For each selected patch, a plurality of patches are created which are close to it in color. For example, eight more colors might be created which are in the color volume around the selected example color by taking the entirety of combinations of:

$$\begin{aligned} R &= n \cdot 25 + 50 \\ G &= m \cdot 25 + 100 \\ B &= p \cdot 25 + 150 \end{aligned} \quad (7)$$

where n, m and p are either 1 or -1.

An alternative method for constructing a database with a desired distribution is as described hereinabove with respect to Figs. 7A and 7B.

Use of the calibrated apparatus of Fig. 13 will now be described, with reference to Fig. 14. There is shown an analog representation 950 of a color image which it is desired to process, using the image processing system of Fig. 13 which comprises graphic software 954 or any other suitable means for producing or modifying representations of color images, including combining or merging means 956 for combining more than one representation of color images into a single representation of a single, combined color image, as well as the scanner 932 and the output device 926.

As shown, the analog representation 950 is read by a color reading device 932, such as a Smart Scanner, commercially available from Scitex Corporation, which is substantially identical to scanner 932 of Fig. 13, and which is loaded with LUT 938 of Fig. 13. Alternatively, the color reading device 932 may not be loaded with LUT 938 nor with any representation of the transformation constructed by transformation construction means 936 of Fig. 13. Instead, the output of color separation unit 952 of the scanner 932, normally in the form of RGB separations or quasi log of RGB separations of the scanner, may be input into transformation operation means 958. Transformation operation means 958 may comprise any suitable computer, such as an IBM PC or a module of the image processing system 924, and is operative to transform the input thereto in accordance with LUT 938 constructed by transformation computation means 936 of Fig. 13.

The transformed output of scanner 932, typically comprising a digital file 960 in the color coordinate system of the image processing system 924, is input to image processing system 924, typically comprising graphic software 954 and/or merging means 956. The digital file 960 may be modified by graphic software 954 and/or it may be merged with another digital image 962 by merging means 956. The merged image may, if desired, be modified by graphics software 954. The final modified and/or merged digital representation 964 is then transformed into an analog image 966, using output device 926 of Fig. 13. The portions of analog image 966 from initial image 950 which did not undergo the modification described hereinabove will be substantially identical in appearance to the initial image 950.

Any suitable method may be employed for merging at least a portion of the digital file 960 with at least a portion of digital image 962. Apparatus and methods for merging color images are described and claimed in Applicant's Israel Application No. 93493, the disclosure of which is incorporated herein by reference.

It will be appreciated by persons skilled in the art that the present invention is not limited to what has been particularly shown and described hereinabove. Rather, the scope of the present invention is defined only by the claims that follow:

```

name MAKE_LUT
5      bss
      public root
      db      02h dup(0)
10     LUT:    public LUT
      db      02h dup(0)
      public sk
      db      04h dup(0)
15     treelength: public treelength
      db      02h dup(0)
      public size1
size1:
20     db      02h dup(0)
      public rgb_listlength
rgb_listlength:
      db      02h dup(0)
      public rgb_list
25     rgb_list: db      02h dup(0)
      impure
err:
30     dw      00h
      dw      00h
      bss
35     k_flag: db      02h dup(0)
msize:
      db      02h dup(0)
40     w:      db      02h dup(0)
      db      02h dup(0)
45
50
55

```

```

weight_factor:
    db      02h dup(0)
cmyk_list:
    db      01e00h dup(0)
matrix:
    db      080h dup(0)
A:
    db      02h dup(0)
    public weight_vec
weight_vec:
    db      02h dup(0)
    public clut
clut:
    db      02h dup(0)
    public mlut
mlut:
    db      02h dup(0)
    public ylut
ylut:
    db      02h dup(0)
    public klut
klut:
    db      02h dup(0)
    public list
list:
    db      02h dup(0)
    public minthresh
minthresh:
    db      02h dup(0)
    public maxthresh
maxthresh:
    db      02h dup(0)
    public lowlimit
lowlimit:
    db      02h dup(0)
    public highlimit
highlimit:
    db      02h dup(0)
    public min_few
min_few:
    db      02h dup(0)
    public f2_exp
f2_exp:
    db      08h dup(0)
    public grey_dist

```

```

grey_dist:
    db      02h dup(0)
    public grey_factor
5  grey_factor:
    db      02h dup(0)
    minval:
    db      08h dup(0)
    public epsilon
10 epsilon:
    db      08h dup(0)
    g_range:
    db      08h dup(0)
    f2:
    db      0200h dup(0)
15
    impure
    public fmult
    fmult:
20
    db      0f0h
    db      068h
    db      0e3h
    db      088h
    db      0b5h
25
    db      0f8h
    db      0e4h
    db      03eh
    db      09ah
    db      099h
30
    db      099h
    db      099h
    db      099h
    db      099h
    db      0b9h
35
    db      03fh
    db      00h
    db      00h
    db      00h
    db      00h
40
    db      00h
    db      00h
    db      0f0h
    db      03fh
    db      066h
45
    db      066h

```

50

55

```

5          db      066h
          db      066h
          db      066h
          db      066h
          db      0e6h
          db      03fh

          bss

10          public endc
endc:      db      02h dup(0)
          public endm
endm:      db      02h dup(0)
          public endy
endy:      db      02h dup(0)
          public endk
endk:      db      02h dup(0)
          public shadow_contrast_flag
shadow_contrast_flag:
          db      02h dup(0)

25          code

          public create_zlut
create_zlut:

30          strings

L2:
          db      03ah
          db      073h
35          db      064h
          db      03ah
          db      070h
          db      072h
          db      069h
40          db      073h
          db      06dh
          db      061h
          db      02fh
          db      066h
45

50

55

```

EP 0 475 554 A2

5	db	069h
	db	06ch
	db	065h
	db	073h
	db	02fh
	db	064h
	db	074h
10	db	073h
	db	02fh
	db	06dh
	db	06bh
	db	06ch
	db	075h
15	db	074h
	db	05fh
	db	063h
	db	06fh
	db	06eh
20	db	066h
	db	02eh
	db	068h
	db	00h

code

strings

30	L3:	db	072h
		db	062h
		db	00h

code

strings

40	L5:	db	020h
		db	0ah
		db	020h
		db	04dh
		db	041h
45		db	04bh

50

55

EP 0 475 554 A2

	db	045h
	db	05fh
	db	04ch
5	db	055h
	db	054h
	db	020h
	db	065h
	db	072h
	db	072h
10	db	06fh
	db	072h
	db	020h
	db	020h
	db	020h
15	db	020h
	db	025h
	db	073h
	db	020h
	db	00h

20 code

strings

25

L6:

	db	020h
	db	0ah
	db	020h
30	db	066h
	db	069h
	db	06ch
	db	065h
	db	020h
	db	03ah
35	db	073h
	db	064h
	db	03ah
	db	070h
	db	072h
40	db	069h
	db	073h
	db	06dh
	db	061h
	db	02fh

45

50

55

EP 0 475 554 A2

5	db	066h
	db	069h
	db	06ch
	db	065h
	db	073h
	db	02fh
	db	064h
	db	074h
10	db	073h
	db	02fh
	db	06dh
	db	06bh
	db	06ch
15	db	075h
	db	074h
	db	05fh
	db	063h
	db	06fh
	db	06eh
20	db	066h
	db	02eh
	db	068h
	db	020h
	db	064h
25	db	06fh
	db	065h
	db	073h
	db	020h
	db	06eh
30	db	06fh
	db	074h
	db	020h
	db	065h
	db	078h
35	db	069h
	db	073h
	db	074h
	db	00h

code

strings

L8:

45

50

55

		db	025h
		db	064h
5		db	020h
		db	025h
		db	064h
		db	020h
		db	025h
10		db	064h
		db	020h
		db	00h
		code	
15		strings	
	L9:		
		db	025h
20		db	064h
		db	020h
		db	00h
		code	
25		strings	
	L10:		
		db	025h
30		db	064h
		db	020h
		db	00h
		code	
35		strings	
	L11:		
40		db	025h
		db	064h
		db	020h
		db	00h
45		code	
50			
55			

EP 0 475 554 A2

```

                                strings
L12:
5      db      025h
      db      064h
      db      020h
      db      00h

10     code

                                strings
L13:
15     db      025h
      db      064h
      db      020h
      db      00h

20     code

                                strings
L14:
25     db      025h
      db      064h
      db      020h
30     db      025h
      db      064h
      db      020h
      db      025h
      db      064h
      db      020h
35     db      025h
      db      064h
      db      00h

40     code

                                strings

45

50

55

```

```

L15:
    db      025h
    db      06ch
5         db      066h
    db      020h
    db      00h

    code

10         strings

L16:
    db      025h
    db      064h
15         db      020h
    db      025h
    db      064h
    db      020h
20         db      025h
    db      064h
    db      020h
    db      025h
    db      064h
25         db      020h
    db      00h

    code

30         strings

L17:
    db      025h
    db      06ch
35         db      066h
    db      020h
    db      025h
    db      06ch
    db      066h
40         db      020h
    db      025h
    db      06ch
    db      066h
45         db      020h

50

55

```

EP 0 475 554 A2

5 db 025h
db 06ch
db 066h
db 020h
db 00h

code

10

strings

L18:

15

db 025h
db 064h
db 020h
db 025h
db 064h
db 020h

20

db 025h
db 064h
db 020h
db 025h
db 064h
db 00h

25

code

30

strings

L19:

35

db 025h
db 064h
db 020h
db 00h

code

40

strings

L20:

45

db 025h
db 064h
db 020h

50

55

```

    db      00h
    code

5
    strings

    L24:
10      db      025h
        db      06ch
        db      066h
        db      00h
        code

15
    strings

    L28:
20      db      025h
        db      06ch
        db      066h
        db      00h
        code

25
    strings

    L32:
30      db      025h
        db      06ch
        db      066h
        db      00h
        code

35
    strings

    L36:
40      db      025h
        db      06ch
        db      066h
        db      00h
        code

45
    strings

50
    strings

55
```

		code
5		
		strings
	L37:	
		db 025h
10		db 064h
		db 020h
		db 025h
		db 064h
		db 020h
15		db 025h
		db 064h
		db 020h
		db 025h
		db 064h
20		db 00h
		code
		strings
25		
	L38:	
		db 025h
		db 064h
30		db 00h
		code
		strings
35		
	L40:	
		db 0ah
		db 020h
		db 063h
40		db 06dh
		db 079h
		db 06bh
		db 028h
		db 030h
45		db 02ch
50		
55		

EP 0 475 554 A2

	db	030h
	db	02ch
5	db	030h
	db	029h
	db	020h
	db	03dh
	db	020h
10	db	025h
	db	064h
	db	020h
	db	025h
	db	064h
15	db	020h
	db	025h
	db	064h
	db	020h
	db	025h
	db	064h
20	db	020h
	db	0ah
	db	00h

code

25

strings

L42:

30	db	020h
	db	0ah
	db	020h
	db	04dh
	db	041h
35	db	04bh
	db	045h
	db	05fh
	db	04ch
	db	055h
40	db	054h
	db	020h
	db	065h
	db	072h
	db	072h
	db	06fh
45	db	072h

50

55

EP 0 475 554 A2

	db	020h
	db	020h
5	db	020h
	db	020h
	db	025h
	db	073h
	db	020h
10	db	00h

code

strings

15

L43:

	db	020h
	db	045h
	db	072h
20	db	072h
	db	06fh
	db	072h
	db	020h
	db	069h
25	db	06eh
	db	020h
	db	06fh
	db	063h
	db	074h
30	db	072h
	db	065h
	db	065h
	db	020h
	db	0ah
35	db	00h

code

strings

40

L45:

	db	020h
	db	0ah
45	db	020h
	db	04dh

50

55

EP 0 475 554 A2

	db	041h
	db	04bh
	db	045h
5	db	05fh
	db	04ch
	db	055h
	db	054h
	db	020h
10	db	065h
	db	072h
	db	072h
	db	06fh
	db	072h
	db	020h
15	db	020h
	db	020h
	db	020h
	db	025h
	db	073h
20	db	020h
	db	00h

code

25

strings

L46:

	db	020h
30	db	045h
	db	072h
	db	072h
	db	06fh
	db	072h
35	db	020h
	db	069h
	db	06eh
	db	020h
	db	063h
40	db	06fh
	db	06eh
	db	073h
	db	074h
	db	072h
45	db	075h

50

55

```

5      db      063h
      db      074h
      db      05fh
      db      06ch
      db      075h
      db      074h
      db      020h
10     db      0ah
      db      00h

```

```

code

```

```

15

```

```

linkage

```

```

L10001:

```

```

      db      09ah
      db      099h
20     db      099h
      db      099h
      db      099h
      db      099h
      db      0d9h
25     db      03fh

```

```

code

```

```

      push    si
      push    di
30     enter   05eh, 00h
      mov     word ptr [bp-052h], 00h
      push    offset L3
      push    offset L2
35     call    fopen
      add     sp, 04h
      mov     word ptr [bp-05eh], ax
      or      ax, ax
      jne     word ptr L4
40     push    offset L6
      push    offset L5

```

```

L20006:

```

```

      call    printf
      add     sp, 04h
45     mov     word ptr [bp-052h], -01h
      jmp     word ptr L7

```

```

50

```

```

55

```

L4:

```

5      lea      ax, word ptr [bp-05ch]
      push     ax
      lea      ax, word ptr [bp-05ah]
      push     ax
      lea      ax, word ptr [bp-058h]
      push     ax
10     push     offset L8
      push     word ptr [bp-05eh]
      push     050h
      lea      ax, word ptr [bp-050h]
      push     ax
      call     fgets
15     add      sp, 06h
      push     ax
      call     sscanf
      add      sp, 0ah
      push     offset minthresh
20     push     offset L9
      push     word ptr [bp-05eh]
      push     050h
      lea      ax, word ptr [bp-050h]
      push     ax
      call     fgets
25     add      sp, 06h
      push     ax
      call     sscanf
      add      sp, 06h
30     push     offset maxthresh
      push     offset L10
      push     word ptr [bp-05eh]
      push     050h
      lea      ax, word ptr [bp-050h]
      push     ax
35     call     fgets
      add      sp, 06h
      push     ax
      call     sscanf
      add      sp, 06h
40     push     offset lowlimit
      push     offset L11
      push     word ptr [bp-05eh]
      push     050h
      lea      ax, word ptr [bp-050h]
45     push     ax

```

50

55

	call	fgets
	add	sp, 06h
	push	ax
5	call	sscanf
	add	sp, 06h
	push	offset highlimit
	push	offset L12
	push	word ptr [bp-05eh]
10	push	050h
	lea	ax, word ptr [bp-050h]
	push	ax
	call	fgets
	add	sp, 06h
15	push	ax
	call	sscanf
	add	sp, 06h
	push	offset min_few
	push	offset L13
20	push	word ptr [bp-05eh]
	push	050h
	lea	ax, word ptr [bp-050h]
	push	ax
	call	fgets
25	add	sp, 06h
	push	ax
	call	sscanf
	add	sp, 06h
	push	offset minval+06h
	push	offset minval+04h
30	push	offset minval+02h
	push	offset minval
	push	offset L14
	push	word ptr [bp-05eh]
	push	050h
35	lea	ax, word ptr [bp-050h]
	push	ax
	call	fgets
	add	sp, 06h
	push	ax
40	call	sscanf
	add	sp, 0ch
	push	offset epsilon
	push	offset L15
	push	word ptr [bp-05eh]
45	push	050h
50		
55		

```

    lea     ax, word ptr [bp-050h]
    push    ax
    call    fgets
5    add     sp, 06h
    push    ax
    call    sscanf
    add     sp, 06h
    push    offset g_range+06h
10    push    offset g_range+04h
    push    offset g_range+02h
    push    offset g_range
    push    offset LI6
    push    word ptr [bp-05eh]
15    push    050h
    lea     ax, word ptr [bp-050h]
    push    ax
    call    fgets
    add     sp, 06h
20    push    ax
    call    sscanf
    add     sp, 0ch
    push    offset fmult+018h
    push    offset fmult+010h
25    push    offset fmult+08h
    push    offset fmult
    push    offset L17
    push    word ptr [bp-05eh]
    push    050h
30    lea     ax, word ptr [bp-050h]
    push    ax
    call    fgets
    add     sp, 06h
    push    ax
35    call    sscanf
    add     sp, 0ch
    push    offset f2_exp+06h
    push    offset f2_exp+04h
    push    offset f2_exp+02h
40    push    offset f2_exp
    push    offset L18
    push    word ptr [bp-05eh]
    push    050h
    lea     ax, word ptr [bp-050h]
    push    ax
45    call    fgets

```

50

55

```

5      add     sp, 06h
      push    ax
      call    sscanf
      add     sp, 0ch
      push    offset grey_dist
      push    offset L19
      push    word ptr [bp-05eh]
      push    050h
10     lea     ax, word ptr [bp-050h]
      push    ax
      call    fgets
      add     sp, 06h
      push    ax
15     call    sscanf
      add     sp, 06h
      push    offset grey_factor
      push    offset L20
      push    word ptr [bp-05eh]
      push    050h
20     lea     ax, word ptr [bp-050h]
      push    ax
      call    fgets
      add     sp, 06h
      push    ax
25     call    sscanf
      add     sp, 06h
      mov     ax, word ptr g_range
      sar     ax, 04h
      mov     word ptr [bp-056h], ax
30     mov     word ptr [bp-054h], 00h
      L23:
      mov     ax, word ptr [bp-054h]
      cmp     ax, word ptr [bp-056h]
      jge     word ptr L21
35     sal     ax, 05h
      add     ax, offset f2
      push    ax
      push    offset L24
      push    word ptr [bp-05eh]
40     call    fscanf
      add     sp, 06h
      inc     word ptr [bp-054h]
      jmp     word ptr L23
      L21:
45     push    word ptr [bp-05eh]

```

50

55

```

5      push    050h
      lea     ax, word ptr [bp-050h]
      push   ax
      call   fgets
      add    sp, 06h
      mov    ax, word ptr g_range+02h
      sar    ax, 04h
10     mov    word ptr [bp-056h], ax
      mov    word ptr [bp-054h], 00h

      L27:
      mov    ax, word ptr [bp-054h]
      cmp    ax, word ptr [bp-056h]
      jge    word ptr L25
15     sal    ax, 05h
      add    ax, offset f2+08h
      push   ax
      push   offset L28
      push   word ptr [bp-05eh]
20     call   fscanf
      add    sp, 06h
      inc    word ptr [bp-054h]
      jmp    word ptr L27

      L25:
25     push   word ptr [bp-05eh]
      push   050h
      lea     ax, word ptr [bp-050h]
      push   ax
      call   fgets
30     add    sp, 06h
      mov    ax, word ptr g_range+04h
      sar    ax, 04h
      mov    word ptr [bp-056h], ax
      mov    word ptr [bp-054h], 00h

      L31:
35     mov    ax, word ptr [bp-054h]
      cmp    ax, word ptr [bp-056h]
      jge    word ptr L29
      sal    ax, 05h
      add    ax, offset f2+010h
40     push   ax
      push   offset L32
      push   word ptr [bp-05eh]
      call   fscanf
      add    sp, 06h
45     inc    word ptr [bp-054h]

50

55

```

```

5          L29:      jmp      word ptr L31
               push     word ptr [bp-05eh]
               push     050h
               lea      ax, word ptr [bp-050h]
               push     ax
10          call     fgets
               add      sp, 06h
               mov      ax, word ptr g_range+06h
               sar      ax, 04h
               mov      word ptr [bp-056h], ax
15          L35:      mov      word ptr [bp-054h], 00h
               mov      ax, word ptr [bp-054h]
               cmp      ax, word ptr [bp-056h]
               jge      word ptr L33
               sal      ax, 05h
20          add      ax, offset f2+018h
               push     ax
               push     offset L36
               push     word ptr [bp-05eh]
               call     fscanf
25          add      sp, 06h
               inc      word ptr [bp-054h]
               jmp      word ptr L35
          L33:      push     word ptr [bp-05eh]
30          push     050h
               lea      ax, word ptr [bp-050h]
               push     ax
               call     fgets
               add      sp, 06h
35          push     offset endk
               push     offset endy
               push     offset endm
               push     offset endc
               push     offset L37
40          push     word ptr [bp-05eh]
               push     050h
               lea      ax, word ptr [bp-050h]
               push     ax
               call     fgets
45          add      sp, 06h
               push     ax
               call     sscanf
50
55

```

```

      add      sp, 0ch
      push     offset shadow_contrast_flag
      push     offset L38
5      push     word ptr [bp-05eh]
      push     050h
      lea      ax, word ptr [bp-050h]
      push     ax
10     call    fgets
      add      sp, 06h
      push     ax
      call    sscanf
      add      sp, 06h
      cmp      word ptr shadow_contrast_flag, 00h
15     je      word ptr L39
      push     word ptr endk
      push     word ptr endy
      push     word ptr endm
      push     word ptr endc
20     push     offset L40
      call    printf
      add      sp, 0ah
L39:
      push     word ptr [bp-05eh]
      push     050h
25     lea      ax, word ptr [bp-050h]
      push     ax
      call    fgets
      add      sp, 06h
30     push     word ptr [bp-05eh]
      call    fclose
      add      sp, 02h
      call    octree
      mov      word ptr [bp-052h], ax
35     cmp      word ptr [bp-052h], 00h
      je      word ptr L41
      push     offset L43
      push     offset L42
      jmp      word ptr L20006
L41:
40     call    construct_lut
      mov      word ptr [bp-052h], ax
      cmp      word ptr [bp-052h], 00h
      je      word ptr L44
      push     offset L46
45     push     offset L45

```

50

55

```

5      L44:      jmp      word ptr L20006
          mov      ax, 0ffh
          mov      word ptr c_p+022h, ax
          mov      word ptr c_p+020h, ax
          mov      word ptr c_p+01eh, ax
          sub      ax, ax
10      mov      word ptr c_p+01ch, ax
          mov      word ptr c_p+01ah, ax
          mov      word ptr c_p+018h, ax
          fldd     cs:word ptr L10001
          fstpf    word ptr exp_num
15      L7:      cmp      word ptr [bp-052h], 00h
          jge      word ptr L1
          push     00h
          push     00h
          push     00h
20      push     0271ch
          call     handle_exc
          add      sp, 08h
          L1:
          fwait
          leave
          pop      di
          pop      si
          ret
          public octree
30      octree:
          strings
          L50:
          db      020h
          db      0ah
          db      020h
          db      00h
          code
          strings
          L51:
          db      020h
45
50
55

```

EP 0 475 554 A2

	db	045h
	db	06eh
	db	074h
5	db	065h
	db	072h
	db	020h
	db	06eh
	db	061h
10	db	06dh
	db	065h
	db	020h
	db	06fh
	db	066h
	db	020h
15	db	072h
	db	067h
	db	062h
	db	020h
	db	074h
20	db	061h
	db	062h
	db	06ch
	db	065h
	db	020h
25	db	00h

code

30	strings
----	---------

L53:

	db	020h
	db	0ah
35	db	020h
	db	04dh
	db	041h
	db	04bh
	db	045h
40	db	05fh
	db	04ch
	db	055h
	db	054h
	db	020h
45	db	065h

50

55

EP 0 475 554 A2

5	db	072h
	db	072h
	db	06fh
	db	072h
	db	020h
	db	020h
	db	020h
10	db	020h
	db	025h
	db	073h
	db	020h
	db	00h

15 code

strings

20	L54:	db	020h
		db	063h
		db	061h
		db	06eh
25		db	06eh
		db	06fh
		db	074h
		db	020h
		db	06fh
30		db	070h
		db	065h
		db	06eh
		db	020h
		db	074h
		db	061h
35		db	062h
		db	06ch
		db	065h
		db	020h
40		db	00h

code

strings

45

50

55

```

L56:
    db      025h
    db      064h
    db      020h
    db      025h
    db      064h
    db      00h

    5

    10      code

           strings

    15      L58:
           db      020h
           db      0ah
           db      020h
           db      04dh
           db      041h
           db      04bh
           db      045h
           db      05fh
           db      04ch
           db      055h
           db      054h
           db      020h
           db      065h
           db      072h
           db      072h
           db      06fh
           db      072h
           db      020h
           db      020h
           db      020h
           db      020h
           db      025h
           db      073h
           db      020h
           db      00h

    20
    25
    30
    35
    40      code

           strings

    45

    50

    55

```

```

L59:
5      db      020h
      db      06dh
      db      069h
      db      06eh
      db      020h
10     db      03ch
      db      020h
      db      030h
      db      020h
      db      07ch
      db      07ch
15     db      020h
      db      06dh
      db      061h
      db      078h
      db      020h
20     db      03eh
      db      020h
      db      032h
      db      035h
      db      036h
25     db      020h
      db      00h

      code

30     strings

L60:
      db      025h
      db      064h
35     db      00h

      code

40     strings

L62:
      db      020h
      db      0ah
45     db      020h
      db      04dh

50

55

```

EP 0 475 554 A2

	db	041h
	db	04bh
	db	045h
5	db	05fh
	db	04ch
	db	055h
	db	054h
	db	020h
10	db	065h
	db	072h
	db	072h
	db	06fh
	db	072h
15	db	020h
	db	020h
	db	020h
	db	020h
	db	025h
20	db	073h
	db	020h
	db	00h

code

25

strings

L63:

	db	020h
30	db	06fh
	db	075h
	db	074h
	db	064h
	db	069h
35	db	06dh
	db	020h
	db	021h
	db	03dh
	db	020h
40	db	033h
	db	020h
	db	00h

code

45

50

55

EP 0 475 554 A2

```

                                     strings
5      L64:                          db      025h
                                     db      064h
                                     db      00h
                                     code
10
                                     strings
15      L66:                          db      025h
                                     db      066h
                                     db      00h
                                     code
20
                                     strings
25      L67:                          db      025h
                                     db      064h
                                     db      00h
                                     code
30
                                     strings
35      L68:                          db      025h
                                     db      064h
                                     db      020h
                                     db      025h
                                     db      064h
40      db      020h
                                     db      025h
                                     db      064h
                                     db      00h
45      code
50
55
```

strings

L70:

5	db	020h
	db	0ah
	db	020h
	db	04dh
	db	041h
10	db	04bh
	db	045h
	db	05fh
	db	04ch
	db	055h
15	db	054h
	db	020h
	db	065h
	db	072h
	db	072h
20	db	06fh
	db	072h
	db	020h
	db	020h
	db	020h
25	db	020h
	db	025h
	db	073h
	db	020h
	db	00h

30

code

strings

L71:

35	db	020h
	db	063h
	db	061h
	db	06eh
40	db	06eh
	db	06fh
	db	074h
	db	020h

45

50

55

EP 0 475 554 A2

5	db	061h
	db	06ch
	db	06ch
	db	06fh
	db	063h
	db	061h
10	db	074h
	db	065h
	db	020h
	db	073h
	db	070h
	db	061h
15	db	063h
	db	065h
	db	020h
	db	066h
	db	06fh
20	db	072h
	db	020h
	db	06ch
	db	069h
	db	073h
25	db	074h
	db	020h
	db	031h
	db	00h

code

30

strings

L74:

35	db	020h
	db	0ah
	db	020h
	db	04dh
	db	041h
40	db	04bh
	db	045h
	db	05fh
	db	04ch
	db	055h
45	db	054h
	db	020h

50

55

EP 0 475 554 A2

	db	065h
	db	072h
5	db	072h
	db	06fh
	db	072h
	db	020h
	db	020h
10	db	020h
	db	020h
	db	025h
	db	073h
	db	020h
15	db	00h

code

strings

20	L75:	db	020h
		db	063h
		db	061h
25		db	06eh
		db	06eh
		db	06fh
		db	074h
		db	020h
30		db	072h
		db	065h
		db	061h
		db	064h
		db	020h
35		db	074h
		db	068h
		db	065h
		db	020h
		db	06ch
		db	069h
40		db	073h
		db	074h
		db	020h
		db	00h

code

45

50

55

EP 0 475 554 A2

```

                                strings
                                .
L78:
5      db      020h
      db      0ah
      db      020h
      db      025h
      db      064h
10     db      020h
      db      069h
      db      074h
      db      065h
      db      06dh
15     db      073h
      db      020h
      db      072h
      db      065h
      db      061h
20     db      064h
      db      020h
      db      00h

```

```

                                code
                                .
25
                                strings
                                .
L79:
30     db      020h
      db      0ah
      db      020h
      db      04dh
      db      041h
      db      04bh
35     db      045h
      db      05fh
      db      04ch
      db      055h
      db      054h
40     db      020h
      db      065h
      db      072h
      db      072h

```

45

50

55

EP 0 475 554 A2

	db	06fh
	db	072h
5	db	020h
	db	020h
	db	020h
	db	020h
	db	025h
10	db	073h
	db	020h
	db	00h

code

15

strings

L80:

	db	020h
	db	063h
	db	061h
	db	06eh
	db	06eh
	db	06fh
25	db	074h
	db	020h
	db	072h
	db	065h
	db	061h
30	db	064h
	db	020h
	db	074h
	db	068h
	db	065h
35	db	020h
	db	06ch
	db	069h
	db	073h
	db	074h
40	db	020h
	db	00h

code

45

strings

50

55

EP 0 475 554 A2

L82:

	db	020h
	db	0ah
5	db	020h
	db	04dh
	db	041h
	db	04bh
	db	045h
	db	05fh
10	db	04ch
	db	055h
	db	054h
	db	020h
	db	065h
15	db	072h
	db	072h
	db	06fh
	db	072h
	db	020h
20	db	020h
	db	020h
	db	020h
	db	025h
	db	073h
25	db	020h
	db	00h

code

30 strings

L83:

	db	020h
35	db	063h
	db	061h
	db	06eh
	db	06eh
	db	06fh
	db	074h
40	db	020h
	db	061h
	db	06ch
	db	06ch

45

50

55

EP 0 475 554 A2

	db	06fh
	db	063h
	db	061h
5	db	074h
	db	065h
	db	020h
	db	073h
	db	070h
10	db	061h
	db	063h
	db	065h
	db	020h
	db	066h
15	db	06fh
	db	072h
	db	020h
	db	074h
	db	072h
	db	065h
20	db	065h
	db	020h
	db	031h
	db	00h

25 code

strings

30	L88:	db	020h
		db	0ah
		db	020h
		db	04dh
		db	041h
35		db	04bh
		db	045h
		db	05fh
		db	04ch
		db	055h
40		db	054h
		db	020h
		db	065h
		db	072h
45		db	072h

50

55

EP 0 475 554 A2

	db	06fh
	db	072h
	db	020h
5	db	020h
	db	020h
	db	020h
	db	025h
	db	073h
10	db	020h
	db	00h

code

15	strings
----	---------

L89:

	db	0ah
	db	020h
20	db	063h
	db	061h
	db	06eh
	db	06eh
	db	06fh
25	db	074h
	db	020h
	db	067h
	db	072h
	db	06fh
	db	077h
30	db	020h
	db	074h
	db	068h
	db	065h
	db	020h
35	db	074h
	db	072h
	db	065h
	db	065h
	db	020h
40	db	00h

code

	push	si
--	------	----

45

50

55

```

5      push    di
      enter   064h, 00h
      sub     ax, ax
      mov     word ptr root, ax
      mov     word ptr list, ax
      sub     ax, ax
      mov     word ptr [bp-060h], ax
      mov     word ptr [bp-05eh], ax
10     push    word ptr RGB_ptr
      push    050h
      lea     ax, word ptr [bp-052h]
      push    ax
      call    fgets
      add     sp, 06h
15     lea     ax, word ptr [bp-05ah]
      push    ax
      lea     ax, word ptr [bp-058h]
      push    ax
      push    offset L56
      push    word ptr RGB_ptr
      push    050h
      lea     ax, word ptr [bp-052h]
      push    ax
      call    fgets
20     add     sp, 06h
      push    ax
      call    sscanf
      add     sp, 08h
      cmp     word ptr [bp-058h], 00h
      jl      word ptr L10002
      cmp     word ptr [bp-05ah], 0100h
      jle     word ptr L57
      L10002:
      push    offset L59
      push    offset L58
35     L20025:
      call    printf
      add     sp, 04h
      mov     word ptr [bp-05eh], -01h
      jmp     word ptr L55
40     L57:
      lea     ax, word ptr [bp-05ch]
      push    ax
      push    offset L60
      push    word ptr RGB_ptr
45
50
55

```

```

5      push    050h
      lea      ax, word ptr [bp-052h]
      push    ax
      call    fgets
      add     sp, 06h
      push    ax
      call    sscanf
      add     sp, 06h
10     cmp     word ptr [bp-05ch], 03h
      je      word ptr L61
      push    offset L63
      push    offset L62
      jmp     word ptr L20025

15     L61:    push    offset size1
      push    offset L64
      push    word ptr RGB_ptr
      push    050h
      lea     ax, word ptr [bp-052h]
20     push    ax
      call    fgets
      add     sp, 06h
      push    ax
      call    sscanf
      add     sp, 06h
25     cmp     word ptr [bp-05ch], 03h
      jne     word ptr L65
      lea     ax, word ptr [bp-064h]
      push    ax
30     push    offset L66
      push    word ptr RGB_ptr
      push    050h
      lea     ax, word ptr [bp-052h]
      push    ax
35     call    fgets
      add     sp, 06h
      push    ax
      call    sscanf
      add     sp, 06h
40     lea     ax, word ptr [bp-064h]
      push    ax
      push    offset L67
      push    word ptr RGB_ptr
      push    050h
45     lea     ax, word ptr [bp-052h]

```

50

55

```

5      push    ax
      call    fgets
      add     sp, 06h
      push    ax
      call    sscanf
      add     sp, 06h
      push    offset GAIN_LEVEL
      push    offset D_12
      push    offset W_12
10     push    offset L68
      push    word ptr RGB_ptr
      push    050h
      lea     ax, word ptr [bp-052h]
      push    ax
15     call    fgets
      add     sp, 06h
      push    ax
      call    sscanf
      add     sp, 0ah
20     L65:
      mov     ax, word ptr size1
      add     ax, 0ah
      mov     word ptr msize, ax
      push    08h
25     push    ax
      call    calloc
      add     sp, 04h
      mov     word ptr list, ax
      cmp     word ptr list, 00h
30     jne     word ptr L69
      push    offset L71
      push    offset L70
      jmp     word ptr L20025
      L69:
35     push    00h
      push    00h
      push    03e8h
      push    word ptr RGB_ptr
      call    fseek
      add     sp, 08h
40     push    word ptr RGB_ptr
      push    word ptr size1
      push    08h
      mov     ax, word ptr list
      add     ax, 08h
45
50
55

```

```

5      push    ax
      call    freadb
      add     sp, 08h
      mov     di, ax
      mov     ax, di
      cwd
      mov     word ptr sk, ax
      mov     word ptr sk+02h, dx
10     or      ax, dx
      je      word ptr L76
      push    offset L75
      push    offset L74
      jmp     word ptr L20025
15     L76:
      push    word ptr RGB_ptr
      call    fclose
      add     sp, 02h
      mov     word ptr RGB_ptr, 00h
20     mov     word ptr msize, 0ccbh
      push    014h
      push    word ptr msize
      call    calloc
      add     sp, 04h
25     mov     word ptr root, ax
      cmp     word ptr root, 00h
      jne     word ptr L81
      push    offset L83
      push    offset L82
30     jmp     word ptr L20025
      L81:
      mov     word ptr treelength, 00h
      mov     word ptr [bp-054h], 01h
35     L86:
      mov     ax, word ptr [bp-054h]
      cmp     ax, word ptr size1
      jg      word ptr L84
      push    ax
      push    word ptr root
      call    growtree
40     add     sp, 04h
      or      ax, ax
      jge     word ptr L87
      push    offset L89
      push    offset L88
45     jmp     word ptr L20025
50
55

```

```

5      L87:      mov     ax, word ptr [bp-05ch]
           add     word ptr [bp-054h], ax
           jmp     word ptr L86

           L84:      inc     word ptr treelength
           push    word ptr root
           call    number_of_sons
10          add     sp, 02h

           L55:      cmp     word ptr [bp-05eh], 00h
           jge     word ptr L90
           push    00h
15          push    00h
           push    00h
           push    0271ch
           call    handle_exc
           add     sp, 08h

           L90:      cmp     word ptr RGB_ptr, 00h
           je      word ptr L91
           push    word ptr RGB_ptr
           call    fclose
20          add     sp, 02h

           L91:      mov     ax, word ptr [bp-060h]
           leave
           pop     di
           pop     si
25          ret

           public Construct_lut
Construct_lut:

           strings

35          L95:      db      020h
           db      0ah
           db      020h
           db      04dh
40          db      041h
           db      04bh
           db      045h
           db      05fh
           db      04ch
45
50
55

```

EP 0 475 554 A2

5	db	055h
	db	054h
	db	020h
	db	065h
	db	072h
	db	072h
10	db	06fh
	db	072h
	db	020h
	db	020h
	db	020h
15	db	025h
	db	073h
	db	020h
	db	00h

20 code

strings

25	L96:	db	0ah
		db	020h
		db	063h
		db	061h
		db	06eh
30		db	06eh
		db	06fh
		db	074h
		db	020h
		db	061h
35		db	06ch
		db	06ch
		db	06fh
		db	063h
		db	061h
40		db	074h
		db	065h
		db	020h
		db	073h
		db	070h
45		db	061h
		db	063h

50

55

EP 0 475 554 A2

	db	065h
	db	020h
5	db	066h
	db	06fh
	db	072h
	db	020h
	db	062h
10	db	072h
	db	061h
	db	06eh
	db	063h
	db	068h
15	db	020h
	db	00h

code

20	strings
----	---------

L99:

	db	020h
	db	045h
25	db	06eh
	db	074h
	db	065h
	db	072h
	db	020h
	db	06eh
30	db	061h
	db	06dh
	db	065h
	db	020h
	db	06fh
35	db	066h
	db	020h
	db	069h
	db	06dh
	db	061h
40	db	067h
	db	065h
	db	020h
	db	074h
	db	061h
45	db	062h

50

55

EP 0 475 554 A2

	db	06ch
	db	065h
5	db	020h
	db	00h
	code	
10	strings	
	L101:	
	db	020h
	db	0ah
15	db	020h
	db	04dh
	db	041h
	db	04bh
	db	045h
20	db	05fh
	db	04ch
	db	055h
	db	054h
	db	020h
25	db	065h
	db	072h
	db	072h
	db	06fh
	db	072h
30	db	020h
	db	020h
	db	020h
	db	020h
	db	025h
	db	073h
35	db	020h
	db	00h
	code	
40	strings	
	L102:	
	db	0ah
45	db	020h
50		
55		

EP 0 475 554 A2

	db	063h
	db	061h
	db	06eh
5	db	06eh
	db	06fh
	db	074h
	db	020h
	db	06fh
	db	070h
10	db	065h
	db	06eh
	db	020h
	db	074h
	db	061h
15	db	062h
	db	06ch
	db	065h
	db	020h
20	db	00h
	code	
	strings	
25	L103:	
	db	025h
	db	064h
	db	020h
30	db	025h
	db	064h
	db	00h
	code	
35	strings	
	L104:	
40	db	025h
	db	064h
	db	00h
	code	
45		
50		
55		

```

                                strings
5      L105:
                                db      025h
                                db      064h
                                db      00h
10
                                code

                                strings
15      L110:
                                db      020h
                                db      0ah
                                db      020h
                                db      04dh
                                db      041h
20      db      04bh
                                db      045h
                                db      05fh
                                db      04ch
                                db      055h
25      db      054h
                                db      020h
                                db      065h
                                db      072h
                                db      072h
30      db      06fh
                                db      072h
                                db      020h
                                db      020h
                                db      020h
35      db      020h
                                db      025h
                                db      073h
                                db      020h
                                db      00h
40
                                code

                                strings
45

50

55

```

L111:

	db	020h
	db	077h
5	db	072h
	db	06fh
	db	06eh
	db	067h
	db	020h
10	db	067h
	db	072h
	db	06fh
	db	075h
	db	070h
15	db	069h
	db	06eh
	db	067h
	db	02dh
	db	020h
20	db	06eh
	db	06fh
	db	074h
	db	020h
	db	033h
25	db	020h
	db	06fh
	db	072h
	db	020h
	db	034h
30	db	020h
	db	00h

code

35

strings

L113:

	db	020h
	db	0ah
40	db	020h
	db	04dh
	db	041h
	db	04bh
	db	045h
45	db	05fh

50

55

EP 0 475 554 A2

5	db	04ch
	db	055h
	db	054h
	db	020h
	db	065h
	db	072h
	db	072h
	db	06fh
10	db	072h
	db	020h
	db	020h
	db	020h
	db	020h
15	db	025h
	db	073h
	db	020h
	db	00h

code

20

strings

L114:

25	db	020h
	db	0ah
	db	020h
	db	063h
	db	061h
30	db	06eh
	db	06eh
	db	06fh
	db	074h
	db	020h
35	db	061h
	db	06ch
	db	06ch
	db	06fh
	db	063h
40	db	061h
	db	074h
	db	065h
	db	020h
	db	073h
45	db	070h

50

55

EP 0 475 554 A2

	db	061h
	db	063h
	db	065h
5	db	020h
	db	066h
	db	06fh
	db	072h
	db	020h
10	db	074h
	db	061h
	db	062h
	db	06ch
	db	065h
15	db	020h
	db	00h

code

20

strings

L117:

	db	020h
	db	0ah
25	db	020h
	db	04dh
	db	041h
	db	04bh
	db	045h
30	db	05fh
	db	04ch
	db	055h
	db	054h
	db	020h
35	db	065h
	db	072h
	db	072h
	db	06fh
	db	072h
40	db	020h
	db	020h
	db	020h
	db	020h
	db	025h
45	db	073h

50

55

EP 0 475 554 A2

		db	020h
		db	00h
5		code	
		strings	
10	L118:	db	0ah
		db	020h
		db	063h
		db	061h
15		db	06eh
		db	06eh
		db	06fh
		db	074h
		db	020h
20		db	072h
		db	065h
		db	061h
		db	064h
		db	020h
25		db	074h
		db	061h
		db	062h
		db	06ch
		db	065h
30		db	020h
		db	00h
		code	
35		strings	
	L121:	db	020h
		db	0ah
40		db	020h
		db	025h
		db	064h
		db	020h
		db	069h
45		db	074h

50

55

EP 0 475 554 A2

	db	065h
	db	06dh
	db	073h
5	db	020h
	db	072h
	db	065h
	db	061h
	db	064h
10	db	020h
	db	00h

code

15

strings

L122:

	db	020h
	db	0ah
20	db	020h
	db	04dh
	db	041h
	db	04bh
	db	045h
25	db	05fh
	db	04ch
	db	055h
	db	054h
	db	020h
30	db	065h
	db	072h
	db	072h
	db	06fh
	db	072h
35	db	020h
	db	020h
	db	020h
	db	020h
	db	025h
40	db	073h
	db	020h
	db	00h

code

45

50

55

strings

5 L123: db 0ah
db 020h
db 063h
db 061h
db 06eh
10 db 06eh
db 06fh
db 074h
db 020h
db 072h
15 db 065h
db 061h
db 064h
db 020h
db 074h
20 db 061h
db 062h
db 06ch
db 065h
db 020h
25 db 00h

code

strings

30 L125: db 020h
db 045h
db 06eh
35 db 074h
db 065h
db 072h
db 020h
db 06eh
40 db 061h
db 06dh
db 065h
db 020h
db 066h

45

50

55

EP 0 475 554 A2

5	db	06fh
	db	072h
	db	020h
	db	06ch
	db	075h
	db	074h
10	db	020h
	db	066h
	db	069h
	db	06ch
	db	065h
15	db	020h
	db	00h

code

20	strings
----	---------

L129:

	db	020h
	db	0ah
25	db	020h
	db	04dh
	db	041h
	db	04bh
	db	045h
30	db	05fh
	db	04ch
	db	055h
	db	054h
	db	020h
	db	065h
35	db	072h
	db	072h
	db	06fh
	db	072h
40	db	020h
	db	020h
	db	020h
	db	020h
	db	025h
	db	073h
45	db	020h
	db	00h

50

55

	code	
5		strings
	L130:	
	db	0ah
	db	020h
10	db	063h
	db	061h
	db	06eh
	db	06eh
	db	06fh
15	db	074h
	db	020h
	db	061h
	db	06ch
	db	06ch
	db	06fh
20	db	063h
	db	061h
	db	074h
	db	065h
	db	020h
25	db	073h
	db	070h
	db	061h
	db	063h
	db	065h
30	db	020h
	db	066h
	db	06fh
	db	072h
	db	020h
35	db	077h
	db	065h
	db	069h
	db	067h
	db	068h
40	db	074h
	db	05fh
	db	066h
	db	061h
	db	063h
45		
50		
55		

		db	074h
		db	06fh
5		db	072h
		db	020h
		db	00h
		code	
10		strings	
	L132:		
		db	020h
15		db	0ah
		db	020h
		db	04dh
		db	041h
		db	04bh
20		db	045h
		db	05fh
		db	04ch
		db	055h
		db	054h
25		db	020h
		db	065h
		db	072h
		db	072h
		db	06fh
30		db	072h
		db	020h
		db	020h
		db	020h
		db	020h
35		db	025h
		db	073h
		db	020h
		db	00h
		code	
40		strings	
	L133:		
45		db	0ah

50

55

EP 0 475 554 A2

	db	020h
	db	06fh
5	db	076h
	db	065h
	db	072h
	db	066h
	db	06ch
10	db	06fh
	db	077h
	db	020h
	db	069h
	db	06eh
15	db	020h
	db	077h
	db	065h
	db	069h
	db	067h
	db	068h
20	db	074h
	db	05fh
	db	066h
	db	061h
	db	063h
25	db	074h
	db	06fh
	db	072h
	db	020h
	db	00h

30 code

strings

35	L136:	db	020h
		db	0ah
		db	020h
		db	04dh
40		db	041h
		db	04bh
		db	045h
		db	05fh
		db	04ch
45		db	055h

50

55

EP 0 475 554 A2

	db	054h
	db	020h
5	db	065h
	db	072h
	db	072h
	db	06fh
	db	072h
10	db	020h
	db	020h
	db	020h
	db	020h
	db	025h
	db	073h
15	db	020h
	db	00h

code

20

strings

L137:

	db	0ah
	db	020h
25	db	063h
	db	061h
	db	06eh
	db	06eh
	db	06fh
30	db	074h
	db	020h
	db	061h
	db	06ch
	db	06ch
35	db	06fh
	db	063h
	db	061h
	db	074h
	db	065h
40	db	020h
	db	073h
	db	070h
	db	061h
	db	063h
45	db	065h

50

55

EP 0 475 554 A2

	db	020h
	db	066h
5	db	06fh
	db	072h
	db	020h
	db	057h
	db	020h
10	db	00h

code

15 strings

L139:

	db	020h
	db	0ah
20	db	020h
	db	04dh
	db	041h
	db	04bh
	db	045h
	db	05fh
25	db	04ch
	db	055h
	db	054h
	db	020h
	db	065h
30	db	072h
	db	072h
	db	06fh
	db	072h
	db	020h
35	db	020h
	db	020h
	db	020h
	db	025h
	db	073h
40	db	020h
	db	00h

code

45 strings

50

55

```

L140:
    db      0ah
    db      020h
    db      06fh
    db      076h
    db      065h
    db      072h
    db      066h
    db      06ch
    db      06fh
    db      077h
    db      020h
    db      069h
    db      06eh
    db      020h
    db      057h
    db      020h
    db      00h

    code

    linkage

L10003:
    dw      03h

    code

    strings

L142:
    db      020h
    db      0ah
    db      020h
    db      04dh
    db      041h
    db      04bh
    db      045h
    db      05fh
    db      04ch
    db      055h
    db      054h

```

EP 0 475 554 A2

	db	020h
	db	065h
5	db	072h
	db	072h
	db	06fh
	db	072h
	db	020h
10	db	020h
	db	020h
	db	020h
	db	025h
	db	073h
	db	020h
15	db	00h

code

20

strings

L143:

	db	0ah
	db	020h
25	db	069h
	db	06eh
	db	063h
	db	06fh
	db	06dh
30	db	070h
	db	061h
	db	074h
	db	069h
	db	062h
35	db	06ch
	db	065h
	db	020h
	db	073h
	db	069h
40	db	07ah
	db	065h
	db	073h
	db	020h
	db	00h

code

45

50

55

```

                                strings
5                                L145:
                                db      020h
                                db      0ah
                                db      020h
                                db      04dh
                                db      041h
10                               db      04bh
                                db      045h
                                db      05fh
                                db      04ch
                                db      055h
15                               db      054h
                                db      020h
                                db      065h
                                db      072h
                                db      072h
20                               db      06fh
                                db      072h
                                db      020h
                                db      020h
                                db      020h
25                               db      020h
                                db      025h
                                db      073h
                                db      020h
                                db      00h
30
                                code

                                strings
35                               L146:
                                db      0ah
                                db      020h
                                db      063h
                                db      061h
40                               db      06eh
                                db      06eh
                                db      06fh
                                db      074h
45

50

55

```

EP 0 475 554 A2

	db	020h
	db	061h
5	db	06ch
	db	06ch
	db	06fh
	db	063h
	db	061h
10	db	074h
	db	065h
	db	020h
	db	073h
	db	070h
15	db	061h
	db	063h
	db	065h
	db	020h
	db	066h
	db	06fh
20	db	072h
	db	020h
	db	077h
	db	065h
	db	069h
25	db	067h
	db	068h
	db	074h
	db	05fh
	db	076h
30	db	065h
	db	063h
	db	00h
	code	
35		
	strings	
	L148:	
40	db	020h
	db	0ah
	db	020h
	db	04dh
	db	041h
45	db	04bh
	db	045h
50		
55		

	db	05fh
	db	04ch
	db	055h
5	db	054h
	db	020h
	db	065h
	db	072h
	db	072h
10	db	06fh
	db	072h
	db	020h
	db	020h
	db	020h
15	db	020h
	db	025h
	db	073h
	db	020h
	db	00h
20	code	
	strings	
25	L149:	
	db	0ah
	db	020h
	db	063h
	db	061h
30	db	06eh
	db	06eh
	db	06fh
	db	074h
	db	020h
35	db	061h
	db	06ch
	db	06ch
	db	06fh
	db	063h
40	db	061h
	db	074h
	db	065h
	db	020h
	db	073h
45	db	070h
50		
55		

EP 0 475 554 A2

	db	061h
	db	063h
5	db	065h
	db	020h
	db	066h
	db	06fh
	db	072h
10	db	020h
	db	063h
	db	06ch
	db	075h
	db	074h
15	db	020h
	db	00h

code

20

strings

L151:

	db	020h
	db	0ah
25	db	020h
	db	04dh
	db	041h
	db	04bh
	db	045h
30	db	05fh
	db	04ch
	db	055h
	db	054h
	db	020h
35	db	065h
	db	072h
	db	072h
	db	06fh
	db	072h
40	db	020h
	db	020h
	db	020h
	db	020h
	db	025h
45	db	073h
	db	020h

50

55

```

                                db      00h
                                code
5
                                strings
                                L152:
10                                db      0ah
                                db      020h
                                db      063h
                                db      061h
                                db      06eh
15                                db      06eh
                                db      06fh
                                db      074h
                                db      020h
                                db      061h
20                                db      06ch
                                db      06ch
                                db      06fh
                                db      063h
                                db      061h
25                                db      074h
                                db      065h
                                db      020h
                                db      073h
                                db      070h
                                db      061h
30                                db      063h
                                db      065h
                                db      020h
                                db      066h
                                db      06fh
35                                db      072h
                                db      020h
                                db      06dh
                                db      06ch
                                db      075h
40                                db      074h
                                db      00h
                                code
45
50
55
```

```

                                strings
5                                L154:
                                db      020h
                                db      0ah
                                db      020h
                                db      04dh
                                db      041h
10                               db      04bh
                                db      045h
                                db      05fh
                                db      04ch
                                db      055h
15                               db      054h
                                db      020h
                                db      065h
                                db      072h
                                db      072h
20                               db      06fh
                                db      072h
                                db      020h
                                db      020h
                                db      020h
25                               db      020h
                                db      025h
                                db      073h
                                db      020h
                                db      00h
30
                                code

                                strings
35                                L155:
                                db      0ah
                                db      020h
                                db      063h
                                db      061h
40                               db      06eh
                                db      06eh
                                db      06fh
                                db      074h
                                db      020h
45                               db      061h

50

55
```

	db	06ch
	db	06ch
5	db	06fh
	db	063h
	db	061h
	db	074h
	db	065h
	db	020h
10	db	073h
	db	070h
	db	061h
	db	063h
	db	065h
15	db	020h
	db	066h
	db	06fh
	db	072h
	db	020h
20	db	079h
	db	06ch
	db	075h
	db	074h
	db	00h

25

code

strings

30		L157:	db	020h
			db	0ah
			db	020h
			db	04dh
35			db	041h
			db	04bh
			db	045h
			db	05fh
			db	04ch
40			db	055h
			db	054h
			db	020h
			db	065h
			db	072h
45			db	072h

50

55

EP 0 475 554 A2

	db	06fh
	db	072h
	db	020h
5	db	020h
	db	020h
	db	020h
	db	025h
	db	073h
10	db	020h
	db	00h

code

15	strings
----	---------

L158:

	db	0ah
	db	020h
20	db	063h
	db	061h
	db	06eh
	db	06eh
	db	06fh
25	db	074h
	db	020h
	db	061h
	db	06ch
	db	06ch
30	db	06fh
	db	063h
	db	061h
	db	074h
	db	065h
35	db	020h
	db	073h
	db	070h
	db	061h
	db	063h
40	db	065h
	db	020h
	db	066h
	db	06fh
	db	072h
45	db	020h

50

55

```

5      db      06bh
      db      06ch
      db      075h
      db      074h
      db      00h

      code

10

      strings

      L159:
15      db      0ah
      db      020h
      db      043h
      db      06fh
      db      06dh
      db      070h
20      db      075h
      db      074h
      db      065h
      db      020h
      db      074h
25      db      068h
      db      065h
      db      020h
      db      06dh
      db      061h
30      db      074h
      db      072h
      db      069h
      db      063h
      db      065h
      db      073h
35      db      020h
      db      0ah
      db      00h

      code

40

      strings

      L161:
45      db      020h

50

55
```

EP 0 475 554 A2

	db	0ah
	db	020h
	db	04dh
5	db	041h
	db	04bh
	db	045h
	db	05fh
	db	04ch
10	db	055h
	db	054h
	db	020h
	db	065h
	db	072h
15	db	072h
	db	06fh
	db	072h
	db	020h
	db	020h
	db	020h
20	db	020h
	db	020h
	db	025h
	db	073h
	db	020h
25	db	00h

code

strings

30		
	L162:	
	db	0ah
	db	020h
	db	063h
35	db	061h
	db	06eh
	db	06eh
	db	06fh
	db	074h
40	db	020h
	db	061h
	db	06ch
	db	06ch
	db	06fh
45	db	063h

50

55

EP 0 475 554 A2

	db	061h
	db	074h
	db	065h
5	db	020h
	db	073h
	db	070h
	db	061h
	db	063h
10	db	065h
	db	020h
	db	066h
	db	06fh
	db	072h
15	db	020h
	db	04ch
	db	055h
	db	054h
	db	020h
20	db	00h

code

strings

25		
	L163:	
	db	0ah
	db	020h
	db	04ch
30	db	045h
	db	056h
	db	045h
	db	04ch
	db	020h
35	db	03dh
	db	020h
	db	031h
	db	020h
	db	020h
40	db	02ah
	db	02ah
	db	02ah
	db	02ah
	db	02ah
45	db	02ah

50

55

EP 0 475 554 A2

	db	02ah
	db	02ah
	db	02ah
5	db	02ah
	db	02ah
	db	02ah
	db	02ah
	db	02ah
10	db	02ah
	db	02ah
	db	02ah
	db	02ah
	db	02ah
15	db	02ah
	db	02ah
	db	02ah
	db	02ah
	db	02ah
20	db	02ah
	db	02ah
	db	020h
	db	0ah
	db	00h
25	code	
	strings	
30	L174:	
	db	0ah
	db	020h
	db	020h
	db	065h
35	db	072h
	db	072h
	db	06fh
	db	072h
	db	020h
40	db	069h
	db	06eh
	db	020h
	db	066h
	db	069h
45	db	074h
50		
55		

EP 0 475 554 A2

	db	05fh
	db	06dh
5	db	061h
	db	074h
	db	072h
	db	069h
	db	078h
10	db	020h
	db	031h
	db	020h
	db	00h
	code	
15		
	strings	
	L176:	
20	db	0ah
	db	020h
	db	04ch
	db	045h
	db	056h
25	db	045h
	db	04ch
	db	020h
	db	03dh
	db	020h
30	db	032h
	db	020h
	db	020h
	db	02ah
	db	02ah
35	db	02ah
	db	02ah
	db	02ah
	db	02ah
40	db	02ah
	db	02ah
	db	02ah
	db	02ah
45	db	02ah
50		
55		

EP 0 475 554 A2

	db	02ah
	db	02ah
	db	02ah
5	db	02ah
	db	02ah
	db	02ah
	db	02ah
	db	02ah
	db	02ah
10	db	02ah
	db	02ah
	db	02ah
	db	020h
	db	0ah
15	db	00h

code

20	strings
----	---------

	L180:		
		db	020h
		db	025h
25		db	064h
		db	00h

code

30	linkage
----	---------

	L10004:		
		dw	020h

35	code
----	------

	strings
--	---------

40	L188:		
		db	0ah
		db	020h
		db	065h
		db	072h

45

50

55

EP 0 475 554 A2

	db	072h
	db	06fh
5	db	072h
	db	020h
	db	069h
	db	06eh
	db	020h
	db	066h
10	db	069h
	db	074h
	db	05fh
	db	06dh
	db	061h
15	db	074h
	db	072h
	db	069h
	db	078h
	db	020h
20	db	032h
	db	020h
	db	00h

code

25

strings

L192:

	db	0ah
30	db	020h
	db	043h
	db	06fh
	db	06dh
	db	070h
35	db	075h
	db	074h
	db	065h
	db	020h
	db	074h
40	db	068h
	db	065h
	db	020h
	db	06ch
	db	075h
45	db	074h

50

55

EP 0 475 554 A2

	db	020h
	db	0ah
5	db	00h
	code	
	strings	
10	L203:	
	db	0ah
	db	020h
	db	072h
15	db	067h
	db	062h
	db	03dh
	db	03dh
	db	020h
20	db	025h
	db	064h
	db	020h
	db	025h
	db	064h
25	db	020h
	db	025h
	db	064h
	db	0ah
	db	00h
30	code	
	strings	
35	L204:	
	db	020h
	db	0ah
	db	020h
	db	04dh
40	db	041h
	db	04bh
	db	045h
	db	05fh
	db	04ch
45	db	055h
50		
55		

	db	054h
	db	020h
5	db	065h
	db	072h
	db	072h
	db	06fh
	db	072h
	db	020h
10	db	020h
	db	020h
	db	020h
	db	025h
	db	073h
15	db	020h
	db	00h
	code	
20		
	strings	
	L205:	
	db	020h
25	db	07ah
	db	065h
	db	072h
	db	06fh
	db	020h
30	db	077h
	db	065h
	db	069h
	db	067h
	db	068h
35	db	074h
	db	020h
	db	00h
	code	
40		
	linkage	
	L10005:	
45	db	00h
	db	00h
50		
55		

EP 0 475 554 A2

5 db 00h
db 00h
db 00h
db 00h
db 0f0h
db 03fh

10 code

linkage

15 L10006: db 00h
db 00h
db 00h
db 00h
db 00h
db 00h
20 db 0e0h
db 03fh

code

25 linkage

30 L10007: dw 02h
code

strings

35 L216: db 020h
db 057h
db 072h
40 db 069h
db 074h
db 065h
db 020h
db 074h
45 db 068h

50

55

EP 0 475 554 A2

	db	065h
	db	020h
5	db	06ch
	db	075h
	db	074h
	db	020h
	db	06fh
	db	06eh
10	db	020h
	db	066h
	db	069h
	db	06ch
	db	065h
15	db	03ah
	db	020h
	db	0ah
	db	020h
	db	00h

20 code

strings

25		L222:	db	020h
			db	0ah
			db	020h
			db	04dh
30			db	041h
			db	04bh
			db	045h
			db	05fh
			db	04ch
35			db	055h
			db	054h
			db	020h
			db	065h
			db	072h
40			db	072h
			db	06fh
			db	072h
			db	020h
			db	020h
45			db	020h

50

55

```

5      db      020h
      db      025h
      db      073h
      db      020h
      db      00h

      code

10     push     si
      push     di
      enter    08ch, 00h
      mov      word ptr rgb_listlength, 00h
      sub      ax, ax
15     mov      word ptr LUT, ax
      mov      word ptr rgb_list, ax
      mov      word ptr weight_factor, ax
      mov      word ptr W, ax
      sub      ax, ax
20     mov      word ptr klut, ax
      mov      word ptr ylut, ax
      mov      word ptr mlut, ax
      mov      word ptr clut, ax
      mov      word ptr weight_vec, ax
25     mov      word ptr A, ax
      sub      ax, ax
      mov      word ptr [bp-078h], ax
      mov      word ptr [bp-076h], ax
      mov      ax, word ptr size1
30     sal      ax, 01h
      mov      word ptr msize, ax
      push     02h
      push     ax
      call     calloc
      add      sp, 04h
35     mov      word ptr rgb_list, ax
      cmp      word ptr rgb_list, 00h
      jne      word ptr L98
      push     offset L96
      push     offset L95
40     L20082:  call     printf
      add      sp, 04h
      mov      word ptr [bp-076h], -01h
      jmp      word ptr L97
45     L98:

50

55

```

```

push    word ptr CMYK_ptr
push    050h
5      lea     ax, word ptr [bp-062h]
push    ax
call    fgets
add     sp, 06h
lea     ax, word ptr [bp-070h]
10     push   ax
lea     ax, word ptr [bp-06eh]
push    ax
push    offset L103
push    word ptr CMYK_ptr
push    050h
15     lea     ax, word ptr [bp-062h]
push    ax
call    fgets
add     sp, 06h
push    ax
20     call    sscanf
add     sp, 08h
lea     ax, word ptr [bp-072h]
push    ax
push    offset L104
25     push    word ptr CMYK_ptr
push    050h
lea     ax, word ptr [bp-062h]
push    ax
call    fgets
30     add     sp, 06h
push    ax
call    sscanf
add     sp, 06h
lea     ax, word ptr [bp-074h]
35     push    ax
push    offset L105
push    word ptr CMYK_ptr
push    050h
lea     ax, word ptr [bp-062h]
40     push    ax
call    fgets
add     sp, 06h
push    ax
call    sscanf
add     sp, 06h
45     cmp     word ptr [bp-072h], 03h

```

50

55

```

5          je      word ptr L20083
          jmp      word ptr L106
L20083:
          mov      word ptr k_flag, 00h
L107:
          mov      ax, word ptr [bp-074h]
          mov      word ptr msize, ax
10         push    08h
          push     ax
          call     calloc
          add      sp, 04h
          mov      word ptr A, ax
15         cmp     word ptr A, 00h
          jne      word ptr L112
          push     offset L114
          push     offset L113
          jmp      word ptr L20082
L112:
20         push    00h
          push     00h
          push     03e8h
          push     word ptr CMYK_ptr
          call     fseek
25         add     sp, 08h
          push     word ptr CMYK_ptr
          push     word ptr [bp-074h]
          push     08h
          push     word ptr A
30         call     freadb
          add     sp, 08h
          mov     di, ax
          mov     ax, di
          cwd
35         mov     word ptr sk, ax
          mov     word ptr sk+02h, dx
          or      ax, dx
          je      word ptr L124
          push     offset L118
40         push     offset L117
          jmp      word ptr L20082
L124:
          mov     ax, word ptr [bp-074h]
          cwd
          idiv    word ptr [bp-072h]
45         mov     word ptr msize, ax

```

50

55

```

    cmp     word ptr msize, 03e8h
    jae
    mov     word ptr msize, 03e8h
5
    L127:   push     04h
           push     word ptr msize
           call     calloc
           add      sp, 04h
10          mov     word ptr weight_factor, ax
           cmp     word ptr weight_factor, 00h
           jne     word ptr L128
           push     offset L130
           push     offset L129
15          jmp     word ptr L20082

    L128:   cmp     word ptr msize, 07ffffh
           jbe     word ptr L131
           push     offset L133
           push     offset L132
20          jmp     word ptr L20082

    L131:   sal     word ptr msize, 02h
           cmp     word ptr msize, 03e8h
           jae
           mov     word ptr msize, 03e8h
25

    L134:   push     04h
           push     word ptr msize
           call     calloc
           add      sp, 04h
           mov     word ptr W, ax
           cmp     word ptr W, 00h
           jne     word ptr L135
           push     offset L137
           push     offset L136
30          jmp     word ptr L20082

    L135:   cmp     word ptr msize, 03ffffh
           jbe     word ptr L138
           push     offset L140
           push     offset L139
           jmp     word ptr L20082
35

    L138:   mov     ax, word ptr [bp-074h]
           cwd
40
45
50
55

```

```

5      idiv    word ptr [bp-072h]
      mov     di, ax
      mov     ax, word ptr size1
      cwd
      idiv    cs:word ptr L10003
      cmp     ax, di
      je      word ptr L141
10     push    offset L143
      push    offset L142
      jmp     word ptr L20082
      L141:
      mov     word ptr msize, 01331h
15     push    08h
      push    word ptr msize
      call    calloc
      add     sp, 04h
      mov     word ptr weight_vec, ax
      cmp     word ptr weight_vec, 00h
20     jne     word ptr L144
      push    offset L146
      push    offset L145
      jmp     word ptr L20082
      L144:
      push    08h
      push    word ptr msize
      call    calloc
      add     sp, 04h
      mov     word ptr clut, ax
30     cmp     word ptr clut, 00h
      jne     word ptr L147
      push    offset L149
      push    offset L148
      jmp     word ptr L20082
      L147:
35     push    08h
      push    word ptr msize
      call    calloc
      add     sp, 04h
      mov     word ptr mlut, ax
40     cmp     word ptr mlut, 00h
      jne     word ptr L150
      push    offset L152
      push    offset L151
      jmp     word ptr L20082
45     L150:
50
55

```

```

5      push    08h
      push    word ptr msize
      call    calloc
      add     sp, 04h
      mov     word ptr ylut, ax
      cmp     word ptr ylut, 00h
      jne     word ptr L153
10     push    offset L155
      push    offset L154
      jmp     word ptr L20082

L153:  push    08h
      push    word ptr msize
15     call    calloc
      add     sp, 04h
      mov     word ptr klut, ax
      cmp     word ptr klut, 00h
      jne     word ptr L156
20     push    offset L158
      push    offset L157
      jmp     word ptr L20082

L156:  push    offset L159
25     call    printf
      add     sp, 02h
      mov     word ptr msize, 01331h
      push    08h
      push    word ptr msize
30     call    calloc
      add     sp, 04h
      mov     word ptr LUT, ax
      cmp     word ptr LUT, 00h
      jne     word ptr L160
35     push    offset L162
      push    offset L161
      jmp     word ptr L20082

L160:  push    offset L163
40     call    printf
      add     sp, 02h
      mov     word ptr [bp-0ah], 040h

L166:  cmp     word ptr [bp-0ah], 0100h
45     jg      word ptr L164
      mov     word ptr [bp-08h], 040h

50

55

```

```

5      L169:      cmp     word ptr [bp-08h], 0100h
           jg      word ptr L167
           mov     word ptr [bp-06h], 040h

10     L172:      cmp     word ptr [bp-06h], 0100h
           jg      word ptr L170
           push    01h
           lea     ax, word ptr [bp-0ah]
           push    ax
           call    fit_matrix
           add     sp, -04h
           mov     word ptr [bp-076h], ax
15     cmp     word ptr [bp-076h], 00h
           jge     word ptr L173
           push    offset L174
           call    printf
           add     sp, 02h

20     L173:      cmp     word ptr [bp-076h], 00h
           jne     word ptr L175
           push    01h
           lea     ax, word ptr [bp-0ah]
           push    ax
           call    getlut
           add     sp, 04h

25     L175:      add     word ptr [bp-06h], 080h
           jmp     word ptr L172

30     L170:      add     word ptr [bp-08h], 080h
           jmp     word ptr L169

35     L167:      add     word ptr [bp-0ah], 080h
           jmp     word ptr L166

40     L164:      push    offset L176
           call    printf
           add     sp, 02h
           mov     word ptr [bp-0ah], 00h

45     L179:      cmp     word ptr [bp-0ah], 0100h
           jle     word ptr L20084
           jmp     word ptr L177

50     L20084:

```

50

55

```

    mov     ax, 0100h
    sub     ax, word ptr [bp-0ah]
    cwd
5   idiv    cs:word ptr L10004
    inc     ax
    push    ax
    push    offset L180
    call    printf
10  add     sp, 04h
    push    offset _file+0eh
    call    fflush
    add     sp, 02h
    mov     word ptr [bp-08h], 00h

15  L183:    cmp     word ptr [bp-08h], 0100h
    jg      word ptr L181
    mov     word ptr [bp-06h], 00h

    L186:    cmp     word ptr [bp-06h], 0100h
20  jg      word ptr L184
    push    02h
    lea     ax, word ptr [bp-0ah]
    push    ax
    call    fit_matrix
25  add     sp, 04h
    mov     word ptr [bp-076h], ax
    cmp     word ptr [bp-076h], 00h
    jge     word ptr L187
    push    offset L188
30  call    printf
    add     sp, 02h

    L187:    cmp     word ptr [bp-076h], 00h
    jne     word ptr L189
    push    02h
35  jmp     word ptr L20029

    L189:    cmp     word ptr [bp-076h], 01h
    jne     word ptr L190
    push    03h
40  L20029:  lea     ax, word ptr [bp-0ah]
    push    ax
    call    getlut
    add     sp, 04h
45
50
55

```

```

L190:      add    word ptr [bp-06h], 020h
           jmp    word ptr L186
5
L184:      add    word ptr [bp-08h], 020h
           jmp    word ptr L183
L181:      add    word ptr [bp-0ah], 020h
           jmp    word ptr L179
10
L177:      mov    word ptr [bp-076h], 00h
           push   offset L192
           call   printf
           add    sp, 02h
           lea    ax, word ptr [bp-012h]
           mov    word ptr [bp-07ah], ax
           mov    word ptr [bp-066h], 00h
15
L195:      cmp    word ptr [bp-066h], 011h
           jl     word ptr L20085
           jmp    word ptr L193
20
L20085:    mov    word ptr [bp-068h], 00h
L198:      cmp    word ptr [bp-068h], 011h
           jl     word ptr L20086
           jmp    word ptr L196
25
L20086:    mov    word ptr [bp-06ah], 00h
L201:      cmp    word ptr [bp-06ah], 011h
           jl     word ptr L20087
           jmp    word ptr L199
30
L20087:    imul   ax, word ptr [bp-068h], 011h
           mov    di, ax
           imul   ax, word ptr [bp-06ah], 0121h
           add    ax, di
           add    ax, word ptr [bp-066h]
           mov    word ptr [bp-07ch], ax
           mov    di, word ptr [bp-07ch]
           sal    di, 03h
           add    di, word ptr weight_vec
           fldd   word ptr [di]
           fstpd  word ptr [bp-08ch]
35
40
45
50
55

```

```

5      fldd      word ptr [bp-08ch]
      fcompd    word ptr epsilon
      call      cfcc
      jae       word ptr L202
      mov       ax, word ptr [bp-06ah]
      sal      ax, 04h
      push     ax
10     mov       ax, word ptr [bp-068h]
      sal      ax, 04h
      push     ax
      mov       ax, word ptr [bp-066h]
      sal      ax, 04h
      push     ax
15     push     offset L203
      call      printf
      add       sp, 08h
      push     offset L205
      push     offset L204
20     jmp      word ptr L20082
      L202:
      fldd      cs:word ptr L10005
      fdivd     word ptr [bp-08ch]
      fstpd     word ptr [bp-08ch]
25     mov       di, word ptr [bp-07ch]
      sal      di, 03h
      add       di, word ptr clut
      fldd      word ptr [di]
      fmuld     word ptr [bp-08ch]
30     fstpd     word ptr [bp-084h]
      fldd      word ptr [bp-084h]
      fadd      cs:word ptr L10006
      call      dp87
      call      idcvt
      add       sp, 08h
35     mov       di, word ptr [bp-07ah]
      mov       word ptr [di], ax
      mov       di, word ptr [bp-07ch]
      sal      di, 03h
      add       di, word ptr mlut
40     fldd      word ptr [di]
      fmuld     word ptr [bp-08ch]
      fstpd     word ptr [bp-084h]
      fldd      word ptr [bp-084h]
      fadd      cs:word ptr L10006
45     call      dp87
50
55

```

```

5      call    idcvr
      add     sp, 08h
      mov     di, word ptr [bp-07ah]
      mov     word ptr [di+02h], ax
      mov     di, word ptr [bp-07ch]
      sal     di, 03h
      add     di, word ptr ylut
10     fldd   word ptr [di]
      fmuld   word ptr [bp-08ch]
      fstpd   word ptr [bp-084h]
      fldd   word ptr [bp-084h]
      fadd    cs:word ptr L10006
      call    dp87
15     call    idcvr
      add     sp, 08h
      mov     di, word ptr [bp-07ah]
      mov     word ptr [di+04h], ax
      mov     di, word ptr [bp-07ch]
20     sal     di, 03h
      add     di, word ptr klut
      fldd   word ptr [di]
      fmuld   word ptr [bp-08ch]
      fstpd   word ptr [bp-084h]
25     fldd   word ptr [bp-084h]
      fadd    cs:word ptr L10006
      call    dp87
      call    idcvr
      add     sp, 08h
30     mov     di, word ptr [bp-07ah]
      mov     word ptr [di+06h], ax
      push    08h
      lea     ax, word ptr [bp-012h]
      push    ax
35     imul   ax, word ptr [bp-068h], 011h
      mov     di, ax
      imul   ax, word ptr [bp-06ah], 0121h
      add     ax, di
      add     ax, word ptr [bp-066h]
40     sal     ax, 03h
      add     ax, word ptr LUT
      push    ax
      call    blkmv
      add     sp, 06h
      inc     word ptr [bp-06ah]
45     jmp     word ptr L201

```

50

55

```

L199:      inc      word ptr [bp-068h]
           jmp      word ptr L198
5
L196:      inc      word ptr [bp-066h]
           jmp      word ptr L195
L193:      cmp      word ptr shadow_contrast_flag, 00h
           jne      word ptr L20088
           jmp      word ptr L206
10
L20088:    mov      ax, word ptr endc
           mov      di, word ptr [bp-07ah]
           mov      word ptr [di], ax
           mov      ax, word ptr endm
           mov      word ptr [di+02h], ax
           mov      ax, word ptr endy
           mov      word ptr [di+04h], ax
           mov      ax, word ptr endk
           mov      word ptr [di+06h], ax
           push     08h
           lea      ax, word ptr [bp-012h]
           push     ax
           push     word ptr LUT
           call     blkmv
           add      sp, 06h
           mov      ax, word ptr endc
           cwd
           idiv     cs:word ptr L10007
           mov      word ptr endc, ax
           mov      ax, word ptr endm
           cwd
           idiv     cs:word ptr L10007
           mov      word ptr endm, ax
           mov      ax, word ptr endy
           cwd
           idiv     cs:word ptr L10007
           mov      word ptr endy, ax
           mov      ax, word ptr endk
           cwd
           idiv     cs:word ptr L10007
           mov      word ptr endk, ax
           lea      ax, word ptr [bp-012h]
           mov      word ptr [bp-07ah], ax
           mov      word ptr [bp-066h], 01h
20
25
30
35
40
45
50
55

```

```

L209:
5      cmp      word ptr [bp-066h], 00h
      jge      word ptr L20089
      jmp      word ptr L206
L20089:
      mov      word ptr [bp-068h], 01h
L212:
10     cmp      word ptr [bp-068h], 00h
      jge      word ptr L20090
      jmp      word ptr L210
L20090:
      mov      word ptr [bp-06ah], 01h
L215:
15     cmp      word ptr [bp-06ah], 00h
      jge      word ptr L20091
      jmp      word ptr L213
L20091:
      push     08h
20     mov      di, word ptr [bp-068h]
      add      di, di
      imul     ax, di, 011h
      mov      si, ax
      mov      di, word ptr [bp-06ah]
25     add      di, di
      imul     ax, di, 0121h
      add      ax, si
      add      ax, word ptr [bp-066h]
      add      ax, word ptr [bp-066h]
30     sal      ax, 03h
      add      ax, word ptr LUT
      push     ax
      lea      ax, word ptr [bp-012h]
      push     ax
      call     blkmv
35     add      sp, 06h
      mov      di, word ptr [bp-07ah]
      mov      ax, word ptr [di]
      cwd
      idiv     cs:word ptr L10007
40     mov      word ptr [di], ax
      mov      ax, word ptr endc
      add      word ptr [di], ax
      mov      ax, word ptr [di+02h]
      cwd
45     idiv     cs:word ptr L10007

```

50

55

```

    mov     word ptr [di+02h], ax
    mov     ax, word ptr endm
    add     word ptr [di+02h], ax
5    mov     ax, word ptr [di+04h]
    cwd
    idiv    cs:word ptr L10007
    mov     word ptr [di+04h], ax
    mov     ax, word ptr endy
10    add     word ptr [di+04h], ax
    mov     ax, word ptr [di+06h]
    cwd
    idiv    cs:word ptr L10007
    mov     word ptr [di+06h], ax
15    mov     ax, word ptr endk
    add     word ptr [di+06h], ax
    push    08h
    lea     ax, word ptr [bp-012h]
    push    ax
20    imul    ax, word ptr [bp-068h], 011h
    mov     di, ax
    imul    ax, word ptr [bp-06ah], 0121h
    add     ax, di
    add     ax, word ptr [bp-066h]
25    sal     ax, 03h
    add     ax, word ptr LUT
    push    ax
    call    blkmv
    add     sp, 06h
    dec     word ptr [bp-06ah]
30    jmp     word ptr L215
    L213:
    dec     word ptr [bp-068h]
    jmp     word ptr L212
    L210:
35    dec     word ptr [bp-066h]
    jmp     word ptr L209
    L206:
    push    offset L216
    call    printf
40    add     sp, 02h
    jmp     word ptr L217
    L220:
    cmp     word ptr [bp-064h], 04h
    jge     word ptr L217
45    push    word ptr clut

```

50

55

```

5      mov     ax, word ptr [bp-064h]
      sal     ax, 01h
      add     ax, word ptr [bp-07ah]
      push    ax
      call    arrange_lut
      add     sp, 04h
10     push    word ptr [bp-04h]
      push    02000h
      push    02h
      push    word ptr clut
      call    fwrite
      add     sp, 08h
15     mov     word ptr [bp-06ch], ax
      cmp     ax, 02000h
      je      word ptr L221
      push    0ah
      push    offset L222
20     jmp     word ptr L20082
L221:
      inc     word ptr [bp-064h]
      jmp     word ptr L220
L217:
25     call    get_buf3d
      mov     ax, word ptr LUT
      mov     word ptr [bp-07ah], ax
      mov     word ptr [bp-064h], 00h
L225:
30     cmp     word ptr [bp-064h], 04h
      jge     word ptr L223
      mov     ax, word ptr [bp-064h]
      sal     ax, 0eh
      add     ax, word ptr buf_current
35     push    ax
      mov     ax, word ptr [bp-064h]
      sal     ax, 01h
      add     ax, word ptr [bp-07ah]
      push    ax
      call    arrange_lut
40     add     sp, 04h
      inc     word ptr [bp-064h]
      jmp     word ptr L225
L223:
45     call    init_grad
      mov     word ptr gcor_lut, 01h
      push    word ptr buf_current
50
55

```

```

    call    load3d
    add     sp, 02h
    mov     word ptr LUT_TYPE, 0ah
    mov     ax, word ptr D_12
    mov     word ptr DARK12, ax
    mov     ax, word ptr W_12
    mov     word ptr WHITE12, ax
    push    00h
    push    00h
    push    00h
    push    02719h
    call    handle_exc
    add     sp, 08h
    jmp     word ptr L97
L106:
    cmp     word ptr [bp-072h], 04h
    jne     word ptr L108
    mov     word ptr k_flag, 01h
    jmp     word ptr L107
L108:
    push    offset L111
    push    offset L110
    jmp     word ptr L20082
L97:
    cmp     word ptr [bp-076h], 00h
    jge     word ptr L226
    push    00h
    push    00h
    push    00h
    push    0271ch
    call    handle_exc
    add     sp, 08h
L226:
    cmp     word ptr W, 00h
    je      word ptr L227
    push    word ptr W
    call    free
    add     sp, 02h
L227:
    cmp     word ptr weight_factor, 00h
    je      word ptr L228
    push    word ptr weight_factor
    call    free
    add     sp, 02h
L228:

```

```

5      cmp      word ptr rgb_list, 00h
      je       word ptr L229
      push     word ptr rgb_list
      call     free
      add      sp, 02h
      L229:

10     cmp      word ptr LUT, 00h
      je       word ptr L230
      push     word ptr LUT
      call     free
      add      sp, 02h
      L230:

15     cmp      word ptr A, 00h
      je       word ptr L231
      push     word ptr A
      call     free
      add      sp, 02h
      L231:

20     cmp      word ptr weight_vec, 00h
      je       word ptr L232
      push     word ptr weight_vec
      call     free
      add      sp, 02h
      L232:

25     cmp      word ptr clut, 00h
      je       word ptr L233
      push     word ptr clut
      call     free
      add      sp, 02h
      L233:

30     cmp      word ptr mlut, 00h
      je       word ptr L234
      push     word ptr mlut
      call     free
      add      sp, 02h
      L234:

35     cmp      word ptr ylut, 00h
      je       word ptr L235
      push     word ptr ylut
      call     free
      add      sp, 02h
      L235:

40     cmp      word ptr klut, 00h
      je       word ptr L236
      push     word ptr klut
      L236:

45

50

55

```

```

    call    free
    add     sp, 02h
L236:
    cmp     word ptr list, 00h
    je      word ptr L237
    push    word ptr list
    call    free
    add     sp, 02h
L237:
    cmp     word ptr root, 00h
    je      word ptr L238
    push    word ptr root
    call    free
    add     sp, 02h
L238:
    push    word ptr CMYK_ptr
    call    fclose
    add     sp, 02h
    mov     ax, word ptr [bp-078h]
    fwait
    leave
    pop     di
    pop     si
    ret
    public fit_matrix
fit_matrix:
    strings

L245:
    db      0ah
    db      020h
    db      025h
    db      064h
    db      020h
    db      065h
    db      06ch
    db      065h
    db      06dh
    db      065h
    db      06eh
    db      074h
    db      073h
    db      020h
    db      02dh

```

EP 0 475 554 A2

5	db	020h
	db	074h
	db	06fh
	db	06fh
	db	020h
	db	06dh
	db	061h
10	db	06eh
	db	079h
	db	020h
	db	00h

code

strings

L265:

20	db	0ah
	db	020h
	db	025h
	db	064h
	db	020h
25	db	065h
	db	06ch
	db	065h
	db	06dh
	db	065h
30	db	06eh
	db	074h
	db	073h
	db	020h
	db	02dh
35	db	020h
	db	074h
	db	06fh
	db	06fh
	db	020h
	db	06dh
40	db	061h
	db	06eh
	db	079h
	db	020h
	db	00h

55

	code
5	strings
	L271:
	db 0ah
	db 020h
10	db 06eh
	db 06fh
	db 020h
	db 073h
	db 06fh
15	db 06ch
	db 075h
	db 074h
	db 069h
	db 06fh
20	db 06eh
	db 020h
	db 066h
	db 06fh
	db 072h
25	db 020h
	db 072h
	db 067h
	db 062h
	db 020h
	db 03dh
30	db 020h
	db 025h
	db 064h
	db 020h
	db 025h
35	db 064h
	db 020h
	db 025h
	db 064h
	db 020h
40	db 02ch
	db 020h
	db 020h
	db 025h
	db 064h
45	db 020h
50	
55	

EP 0 475 554 A2

	db	065h
	db	06ch
	db	065h
5	db	06dh
	db	065h
	db	06eh
	db	074h
	db	073h
10	db	020h
	db	0ah
	db	020h
	db	00h
15	code	
	push	si
	push	di
	enter	028h, 00h
20	movb	byte ptr [bp-01h], 061h
	movb	byte ptr [bp-03h], 041h
	mov	ax, 0100h
	mov	cx, word ptr [bp+0ah]
	sar	ax, cl
25	mov	word ptr [bp-08h], ax
	sar	ax, 01h
	mov	word ptr [bp-0ah], ax
	mov	di, word ptr [bp+08h]
	and	ax, word ptr [di]
	je	word ptr L240
30	mov	ax, word ptr [bp-0ah]
	and	ax, word ptr [di+02h]
	je	word ptr L240
	mov	ax, word ptr [bp-0ah]
	and	ax, word ptr [di+04h]
35	je	word ptr L240
	mov	word ptr [bp-06h], 00h
	jmp	word ptr L241
	L240:	
	L241:	mov word ptr [bp-06h], 01h
40		
	cmp	word ptr [bp-06h], 00h
	jne	word ptr L242
	push	word ptr [bp+0ah]
	push	word ptr [bp+08h]
45	call	findleaf
50		
55		

```

      add      sp, 04h
      mov      word ptr [bp-016h], ax
      cmp      word ptr [bp-016h], 00h
5      jg       word ptr L243
      cmp      word ptr [bp+0ah], 00h
      je       word ptr L243
      L20092:
      mov      ax, 02h
10     jmp      word ptr L239
      L243:
      imul     ax, word ptr [bp-016h], 014h
      mov      di, ax
      add      di, word ptr root
15     mov      ax, word ptr [di]
      mov      word ptr [bp-0ch], ax
      cmp      word ptr [bp-0ch], 01e0h
      jl       word ptr L244
      push     ax
20     push     offset L245
      L20095:
      call     printf
      add      sp, 04h
      L20096:
      mov      ax, -01h
25     jmp      word ptr L239
      L244:
      mov      word ptr rgb_listlength, 00h
      imul     ax, word ptr [bp-016h], 014h
30     add      ax, word ptr root
      push     ax
      call     readtree
      add      sp, 02h
      L246:
      mov      ax, word ptr [bp-0ch]
35     cmp      ax, word ptr min_few
      jle      word ptr L20092
      mov      di, word ptr [bp+0ah]
      sal      di, 01h
      cmp      ax, word ptr [di+minval]
40     jl       word ptr L20097
      jmp      word ptr L268
      L20097:
      call     getfew
      L269:
45     sub      ax, ax

```

50

55

```

5          L242:      jmp      word ptr L239
               cmp      word ptr [bp-06h], 01h
               jne      word ptr L20096
               inc      word ptr [bp+0ah]
               mov      word ptr rgb_listlength, 00h
10          L250:      mov      word ptr [bp-0ch], 00h
               mov      word ptr [bp-024h], -05h
               cmp      word ptr [bp-024h], 0ah
               jl       word ptr L20098
               jmp      word ptr L248
15          L20098:      mov      di, word ptr [bp+08h]
               mov      ax, word ptr [bp-024h]
               add      ax, word ptr [di]
               mov      word ptr [bp-012h], ax
               cmp      word ptr [bp-012h], 00h
20          L20099:      jg       word ptr L20099
               jmp      word ptr L251
               cmp      word ptr [bp-012h], 0100h
               jl       word ptr L20100
               jmp      word ptr L251
25          L20100:      mov      word ptr [bp-026h], -05h
               L254:      mov      word ptr [bp-026h], 0ah
               cmp      word ptr [bp-026h], 0ah
               jl       word ptr L20101
               jmp      word ptr L251
30          L20101:      mov      di, word ptr [bp+08h]
               mov      ax, word ptr [bp-026h]
               add      ax, word ptr [di+02h]
               mov      word ptr [bp-010h], ax
               cmp      word ptr [bp-010h], 00h
               jg       word ptr L20102
               jmp      word ptr L255
35          L20102:      cmp      word ptr [bp-010h], 0100h
               jl       word ptr L20103
               jmp      word ptr L255
40          L20103:      mov      word ptr [bp-028h], -05h
               L258:
45
50
55

```

```

      cmp      word ptr [bp-028h], 0ah
      jl       word ptr L20104
      jmp      word ptr L255
5
L20104:
      mov      di, word ptr [bp+08h]
      mov      ax, word ptr [bp-028h]
      add      ax, word ptr [di+04h]
      mov      word ptr [bp-0eh], ax
10
      cmp      word ptr [bp-0eh], 00h
      jle      word ptr L259
      cmp      word ptr [bp-0eh], 0100h
      jge      word ptr L259
      push     word ptr [bp+0ah]
15
      lea      ax, word ptr [bp-012h]
      push     ax
      call     findleaf
      add      sp, 04h
      mov      word ptr [bp-016h], ax
20
      cmp      word ptr [bp-016h], 00h
      je       word ptr L259
      cmp      word ptr [bp-016h], 00h
      jge      word ptr L261
      neg      ax
25
      push     ax
      push     word ptr [bp+0ah]
      lea      ax, word ptr [bp-012h]
      push     ax
      call     checkval
30
      add      sp, 06h
      mov      word ptr [bp-014h], ax
      cmp      word ptr [bp-014h], 01h
      jne      word ptr L259
      mov      di, word ptr rgb_listlength
35
      inc      word ptr rgb_listlength
      sal      di, 01h
      add      di, word ptr rgb_list
      mov      ax, word ptr [bp-016h]
      neg      ax
40
      mov      word ptr [di], ax
      inc      word ptr [bp-0ch]
      jmp      word ptr L259
L261:
      imul     ax, word ptr [bp-016h], 014h
45
      mov      di, ax
      add      di, word ptr root
50
55

```

```

5      mov     ax, word ptr [di]
      add     word ptr [bp-0ch], ax
      imul    ax, word ptr [bp-016h], 014h
      add     ax, word ptr root
      push    ax
      call    readtree
      add     sp, 02h
10      L259:   add     word ptr [bp-028h], 0ah
      jmp     word ptr L258
      L255:   add     word ptr [bp-026h], 0ah
      jmp     word ptr L254
15      L251:   add     word ptr [bp-024h], 0ah
      jmp     word ptr L250
      L248:   dec     word ptr [bp+0ah]
20      cmp     word ptr [bp-0ch], 01e0h
      jge     word ptr L20105
      jmp     word ptr L246
      L20105:  push    word ptr [bp-0ch]
25      push    offset L265
      jmp     word ptr L20095
      L268:   push    word ptr [bp-08h]
      push    word ptr [bp+08h]
30      call    getR
      add     sp, 04h
      call    getmat
      mov     word ptr [bp-014h], ax
      cmp     word ptr [bp-014h], 00h
35      jl      word ptr L20106
      jmp     word ptr L269
      L20106:  push    word ptr [bp-0ch]
      mov     di, word ptr [bp+08h]
40      push    word ptr [di+04h]
      push    word ptr [di+02h]
      push    word ptr [di]
      push    offset L271
      call    printf
      add     sp, 0ah
45      mov     ax, word ptr [bp-014h]
50
55

```

```

5      L239:      leave
           pop     di
           pop     si
           ret
           public getR
getR:
10      linkage

L10008:
15      dw        0100h

           code

           linkage

20      L10009:
           db        00h
           db        00h
           db        00h
           db        00h
25      db        00h
           db        088h
           db        0c3h
           db        040h

           code

           linkage

35      L10010:
           db        00h
           db        00h
           db        00h
           db        00h
40      db        00h
           db        06ah
           db        0f8h
           db        040h

           code

45

50

55
```

```

linkage

5          L10011:      dw      0ah

                                code

10          push      si
           push      di
           enter     084h, 00h
           mov       word ptr [bp-04h], 00h
           mov       word ptr [bp-06h], 00h
           L275:
15          cmp       word ptr [bp-06h], 03h
           jge       word ptr L273
           mov       di, word ptr [bp-06h]
           sal       di, 03h
           add       di, bp
           fldz
20          fstpd     word ptr [di-05ch]
           inc       word ptr [bp-06h]
           jmp       word ptr L275
           L273:
25          mov       word ptr [bp-06h], 00h
           L278:
           cmp       word ptr [bp-06h], 04h
           jge       word ptr L276
           mov       di, word ptr [bp-06h]
           sal       di, 03h
           add       di, bp
           fldz
           fstpd     word ptr [di-07ch]
           inc       word ptr [bp-06h]
           jmp       word ptr L278
           L276:
35          mov       word ptr [bp-0ch], 03h
           cmp       word ptr k flag, 00h
           je        word ptr L279
           mov       word ptr [bp-0ch], 04h
           L279:
40          fldd      cs:word ptr L10005
           fdivi     word ptr [bp+0ah]
           fstpd     word ptr [bp-034h]
           mov       word ptr [bp-06h], 00h
45

50

55

```

```

L282:
5      mov     ax, word ptr [bp-06h]
      cmp     ax, word ptr rgb_listlength
      jl      word ptr L20108
      jmp     word ptr L280

L20108:
10     mov     di, word ptr [bp-06h]
      sal     di, 01h
      add     di, word ptr rgb_list
      mov     ax, word ptr [di]
      mov     word ptr [bp-02h], ax
      mov     di, word ptr [bp-04h]
15     sal     di, 02h
      add     di, word ptr W
      fldd    cs:word ptr L10005
      fstpf   word ptr [di]
      mov     di, word ptr [bp-02h]
20     sal     di, 03h
      add     di, word ptr list
      fldd    word ptr [di]
      mov     di, word ptr [bp-04h]
      inc     di
      sal     di, 02h
25     add     di, word ptr W
      fstf    word ptr [di]
      fstpd   word ptr [bp-014h]
      mov     di, word ptr [bp-02h]
      inc     di
30     sal     di, 03h
      add     di, word ptr list
      fldd    word ptr [di]
      mov     di, word ptr [bp-04h]
      inc     di
35     inc     di
      sal     di, 02h
      add     di, word ptr W
      fstf    word ptr [di]
      fstpd   word ptr [bp-01ch]
40     mov     di, word ptr [bp-02h]
      inc     di
      inc     di
      sal     di, 03h
      add     di, word ptr list
45     fldd    word ptr [di]
      mov     di, word ptr [bp-04h]

```

50

55

```

5      add     di, 03h
      sal     di, 02h
      add     di, word ptr w
      fstf    word ptr [di]
      fstpd   word ptr [bp-024h]
      fldd    word ptr [bp-014h]
      fadd    word ptr [bp-05ch]
      fstpd   word ptr [bp-05ch]
10     fldd    word ptr [bp-01ch]
      fadd    word ptr [bp-054h]
      fstpd   word ptr [bp-054h]
      fldd    word ptr [bp-024h]
      fadd    word ptr [bp-04ch]
15     fstpd   word ptr [bp-04ch]
      dec     ax
      imul    word ptr [bp-0ch]
      cwd
      idiv    cs:word ptr L10003
20     mov     word ptr [bp-0ah], ax
      mov     word ptr [bp-08h], 00h
      L285:
      cmp     word ptr [bp-08h], 03h
      jge     word ptr L283
25     mov     di, word ptr [bp-08h]
      add     di, word ptr [bp-0ah]
      sal     di, 03h
      add     di, word ptr A
      fldd    word ptr [di]
30     mov     si, word ptr [bp-08h]
      sal     si, 02h
      mov     di, word ptr [bp-06h]
      sal     di, 04h
      add     di, si
      fstpf   word ptr [di+cmyk_list]
35     inc     word ptr [bp-08h]
      jmp     word ptr L285
      L283:
      cmp     word ptr k flag, 00h
      je      word ptr L286
40     mov     di, word ptr [bp-0ah]
      add     di, 03h
      sal     di, 03h
      add     di, word ptr A
      fldd    word ptr [di]
45     mov     di, word ptr [bp-06h]

```

50

55

```

5          sal    di, 04h
          jmp     word ptr L20107
L286:      mov     di, word ptr [bp-06h]
          sal     di, 04h
          fldi    cs:word ptr L10008
L20107:    fstpf   word ptr [di+cmyk_list+0ch]
          mov     word ptr [bp-08h], 00h
L290:      cmp     word ptr [bp-08h], 04h
          jge     word ptr L288
          mov     si, word ptr [bp-08h]
          sal     si, 02h
          mov     di, word ptr [bp-06h]
          sal     di, 04h
          add     di, si
          fldf    word ptr [di+cmyk_list]
          mov     di, word ptr [bp-08h]
          sal     di, 03h
          add     di, bp
          fadd    word ptr [di-07ch]
          fstpd   word ptr [di-07ch]
          inc     word ptr [bp-08h]
          jmp     word ptr L290
L288:      mov     si, word ptr [bp+08h]
          mov     di, word ptr [bp-02h]
          sal     di, 03h
          add     di, word ptr list
          fldd    word ptr [di]
          fsubi   word ptr [si]
          fstpd   word ptr [bp-03ch]
          fldz
          fcompd  word ptr [bp-03ch]
          call    cfcc
          jbe     word ptr L291
          fldd    word ptr [bp-03ch]
          fchs
          fstpd   word ptr [bp-03ch]
L291:      mov     si, word ptr [bp+08h]
          mov     di, word ptr [bp-02h]
          inc     di
          sal     di, 03h

```

```

5      add     di, word ptr list
      fldd     word ptr [di]
      fsubi    word ptr [si+02h]
      fstpd    word ptr [bp-044h]
      fldz
      fcompd   word ptr [bp-044h]
      call     cfcc
      jbe      word ptr L292
10     fldd     word ptr [bp-044h]
      fchs
      fstpd    word ptr [bp-044h]
      L292:
      fldd     word ptr [bp-03ch]
15     fcompd   word ptr [bp-044h]
      call     cfcc
      jae      word ptr L293
      fldd     word ptr [bp-044h]
      fstpd    word ptr [bp-03ch]
      L293:
20     mov      si, word ptr [bp+08h]
      mov      di, word ptr [bp-02h]
      inc      di
      inc      di
      sal      di, 03h
25     add      di, word ptr list
      fldd     word ptr [di]
      fsubi    word ptr [si+04h]
      fstpd    word ptr [bp-044h]
      fldz
30     fcompd   word ptr [bp-044h]
      call     cfcc
      jbe      word ptr L294
      fldd     word ptr [bp-044h]
      fchs
35     fstpd    word ptr [bp-044h]
      L294:
      fldd     word ptr [bp-03ch]
      fcompd   word ptr [bp-044h]
      call     cfcc
40     jae      word ptr L295
      fldd     word ptr [bp-044h]
      fstpd    word ptr [bp-03ch]
      L295:
45     fldi     cs:word ptr L10003
      fstpd    word ptr [bp-084h]
50
55

```

```

5      fldd    word ptr [bp-014h]
      fadd    word ptr [bp-01ch]
      fadd    word ptr [bp-024h]
      fdivd   word ptr [bp-084h]
      fstpd   word ptr [bp-02ch]
      fldd    word ptr [bp-02ch]
      frsubd  word ptr [bp-014h]
10     fstpd   word ptr [bp-014h]
      fldz
      fcompd  word ptr [bp-014h]
      call    cfcc
      jbe     word ptr L296
      fldd    word ptr [bp-014h]
15     fchs
      fstpd   word ptr [bp-014h]
      L296:
      fldd    word ptr [bp-02ch]
      frsubd  word ptr [bp-01ch]
20     fstpd   word ptr [bp-01ch]
      fldz
      fcompd  word ptr [bp-01ch]
      call    cfcc
      jbe     word ptr L297
25     fldd    word ptr [bp-01ch]
      fchs
      fstpd   word ptr [bp-01ch]
      L297:
      fldd    word ptr [bp-02ch]
      frsubd  word ptr [bp-024h]
30     fstpd   word ptr [bp-024h]
      fldz
      fcompd  word ptr [bp-024h]
      call    cfcc
      jbe     word ptr L298
35     fldd    word ptr [bp-024h]
      fchs
      fstpd   word ptr [bp-024h]
      L298:
      fldd    cs:word ptr L10005
40     fadd    word ptr [bp-03ch]
      fstpd   word ptr [bp-084h]
      mov     di, word ptr [bp-06h]
      sal     di, 02h
      add     di, word ptr weight_factor
45     fldd    cs:word ptr L10009

```

```

      fdivd    word ptr [bp-084h]
      fstpf    word ptr [di]
5      mov     di, word ptr [bp-06h]
      sal     di, 02h
      add     di, word ptr weight_factor
      fldf     word ptr [di]
      mov     di, word ptr [bp-06h]
10     sal     di, 02h
      add     di, word ptr weight_factor
      fmul     word ptr [di]
      fstpf    word ptr [di]
      fldi     word ptr grey_dist
      fcompd   word ptr [bp-014h]
15     call    cfcc
      jbe     word ptr L299
      fldi     word ptr grey_dist
      fcompd   word ptr [bp-01ch]
      call    cfcc
20     jbe     word ptr L299
      fldi     word ptr grey_dist
      fcompd   word ptr [bp-024h]
      call    cfcc
      jbe     word ptr L299
25     mov     di, word ptr [bp-06h]
      sal     di, 02h
      add     di, word ptr weight_factor
      fldi     word ptr grey_factor
      fmul     word ptr [di]
30     fstpf    word ptr [di]
L299:
      mov     word ptr [bp-08h], 00h
L302:
      cmp     word ptr [bp-08h], 04h
      jge     word ptr L300
35     mov     di, word ptr [bp-06h]
      sal     di, 02h
      add     di, word ptr weight_factor
      fldf     word ptr [di]
      mov     di, word ptr [bp-08h]
40     add     di, word ptr [bp-04h]
      sal     di, 02h
      add     di, word ptr w
      fmul     word ptr [di]
      fstpf    word ptr [di]
45     inc     word ptr [bp-08h]

```

50

55

```

      jmp      word ptr L302
L300:  add      word ptr [bp-04h], 04h
5      inc      word ptr [bp-06h]
      jmp      word ptr L282
L280:  mov      word ptr [bp-08h], 00h
L305:  cmp      word ptr [bp-08h], 03h
10     jge      word ptr L303
      mov      di, word ptr [bp-08h]
      sal      di, 03h
      add      di, bp
15     fldi     word ptr rgb_listlength
      frdivd   word ptr [di-05ch]
      fstpd    word ptr [di-05ch]
      inc      word ptr [bp-08h]
      jmp      word ptr L305
20     L303:  mov      word ptr [bp-08h], 00h
      L308:  cmp      word ptr [bp-08h], 04h
      jge      word ptr L306
25     mov      di, word ptr [bp-08h]
      sal      di, 03h
      add      di, bp
      fldi     word ptr rgb_listlength
      frdivd   word ptr [di-07ch]
      fstpd    word ptr [di-07ch]
30     inc      word ptr [bp-08h]
      jmp      word ptr L308
      L306:  mov      di, word ptr [bp-06h]
      sal      di, 02h
35     add      di, word ptr weight_factor
      fldd     cs:word ptr L10010
      fstpf    word ptr [di]
      mov      di, word ptr [bp-04h]
      sal      di, 02h
40     add      di, word ptr W
      fldl     word ptr [di]
      fstpf    word ptr [di]
      mov      di, word ptr [bp-04h]
      inc      di
45     sal      di, 02h

```

50

55

```

      add     di, word ptr W
      fldi    cs:word ptr L10011
      fadd    word ptr [bp-05ch]
5      fstpf   word ptr [di]
      mov     di, word ptr [bp-04h]
      inc     di
      inc     di
      sal     di, 02h
10      add     di, word ptr W
      fldd    word ptr [bp-054h]
      fstpf   word ptr [di]
      mov     di, word ptr [bp-04h]
      add     di, 03h
15      sal     di, 02h
      add     di, word ptr W
      fldd    word ptr [bp-04ch]
      fstpf   word ptr [di]
      mov     word ptr [bp-08h], 00h
20      L311:
      cmp     word ptr [bp-08h], 04h
      jge     word ptr L309
      mov     di, word ptr [bp-06h]
      sal     di, 02h
25      add     di, word ptr weight_factor
      fldf    word ptr [di]
      mov     di, word ptr [bp-08h]
      add     di, word ptr [bp-04h]
      sal     di, 02h
30      add     di, word ptr W
      fmul    word ptr [di]
      fstpf   word ptr [di]
      inc     word ptr [bp-08h]
      jmp     word ptr L311
      L309:
35      mov     word ptr [bp-08h], 00h
      L314:
      cmp     word ptr [bp-08h], 04h
      jge     word ptr L312
40      mov     di, word ptr [bp-08h]
      sal     di, 03h
      add     di, bp
      fldd    word ptr [di-07ch]
      mov     si, word ptr [bp-08h]
      sal     si, 02h
45      mov     di, word ptr [bp-06h]

```

50

55

```

    sal    di, 04h
    add    di, si
5   fstpf  word ptr [di+cmyk_list]
    inc    word ptr [bp-08h]
    jmp    word ptr L314
L312:
    mov    di, word ptr [bp-06h]
10   sal    di, 04h
    fldi   cs:word ptr L10011
    faddf  word ptr [di+cmyk_list]
    fstpf  word ptr [di+cmyk_list]
    add    word ptr [bp-04h], 04h
    inc    word ptr [bp-06h]
15   mov    di, word ptr [bp-04h]
    sal    di, 02h
    add    di, word ptr W
    fldi   cs:word ptr L10011
    fstpf  word ptr [di]
20   mov    di, word ptr [bp-04h]
    inc    di
    sal    di, 02h
    add    di, word ptr W
    fldd   word ptr [bp-05ch]
25   fstpf  word ptr [di]
    mov    di, word ptr [bp-04h]
    inc    di
    inc    di
    sal    di, 02h
30   add    di, word ptr W
    fldi   cs:word ptr L10011
    fadd   word ptr [bp-054h]
    fstpf  word ptr [di]
    mov    di, word ptr [bp-04h]
35   add    di, 03h
    sal    di, 02h
    add    di, word ptr W
    fldd   word ptr [bp-04ch]
    fstpf  word ptr [di]
40   mov    di, word ptr [bp-06h]
    sal    di, 02h
    add    di, word ptr weight_factor
    fldd   cs:word ptr L10010
    fstpf  word ptr [di]
45   mov    word ptr [bp-08h], 00h
L317:

```

```

5      cmp     word ptr [bp-08h], 04h
      jge     word ptr L315
      mov     di, word ptr [bp-06h]
      sal     di, 02h
      add     di, word ptr weight_factor
      fldf    word ptr [di]
      mov     di, word ptr [bp-08h]
10     add     di, word ptr [bp-04h]
      sal     di, 02h
      add     di, word ptr w
      fmul    word ptr [di]
      fstpf   word ptr [di]
      inc     word ptr [bp-08h]
15     jmp     word ptr L317
      L315:
      mov     word ptr [bp-08h], 00h
      L320:
      cmp     word ptr [bp-08h], 04h
20     jge     word ptr L318
      mov     di, word ptr [bp-08h]
      sal     di, 03h
      add     di, bp
      fldd    word ptr [di-07ch]
      mov     si, word ptr [bp-08h]
25     sal     si, 02h
      mov     di, word ptr [bp-06h]
      sal     di, 04h
      add     di, si
      fstpf   word ptr [di+cmyk_list]
30     inc     word ptr [bp-08h]
      jmp     word ptr L320
      L318:
      mov     di, word ptr [bp-06h]
      sal     di, 04h
35     fldi    cs:word ptr L10011
      faddf   word ptr [di+cmyk_list+04h]
      fstpf   word ptr [di+cmyk_list+04h]
      add     word ptr [bp-04h], 04h
      inc     word ptr [bp-06h]
40     mov     di, word ptr [bp-04h]
      sal     di, 02h
      add     di, word ptr w
      fldl
      fstpf   word ptr [di]
45     mov     di, word ptr [bp-04h]

```

50

55

```

5      inc      di
      sal      di, 02h
      add      di, word ptr W
      fldd     word ptr [bp-05ch]
      fstpf    word ptr [di]
      mov      di, word ptr [bp-04h]
10     inc      di
      inc      di
      sal      di, 02h
      add      di, word ptr W
      fldd     word ptr [bp-054h]
      fstpf    word ptr [di]
15     mov      di, word ptr [bp-04h]
      add      di, 03h
      sal      di, 02h
      add      di, word ptr W
      fldi     cs:word ptr L10011
      fadd     word ptr [bp-04ch]
20     fstpf    word ptr [di]
      mov      di, word ptr [bp-06h]
      sal      di, 02h
      add      di, word ptr weight_factor
      fldd     cs:word ptr L10010
25     fstpf    word ptr [di]
      mov      word ptr [bp-08h], 00h
      L323:
      cmp      word ptr [bp-08h], 04h
      jge      word ptr L321
30     mov      di, word ptr [bp-06h]
      sal      di, 02h
      add      di, word ptr weight_factor
      fldf     word ptr [di]
      mov      di, word ptr [bp-08h]
35     add      di, word ptr [bp-04h]
      sal      di, 02h
      add      di, word ptr W
      fmul     word ptr [di]
      fstpf    word ptr [di]
40     inc      word ptr [bp-08h]
      jmp      word ptr L323
      L321:
      mov      word ptr [bp-08h], 00h
      L326:
      cmp      word ptr [bp-08h], 04h
45     jge      word ptr L324

```

50

55

```

5      mov     di, word ptr [bp-08h]
      sal     di, 03h
      add     di, bp
      fldd    word ptr [di-07ch]
      mov     si, word ptr [bp-08h]
      sal     si, 02h
      mov     di, word ptr [bp-06h]
10     sal     di, 04h
      add     di, si
      fstpf   word ptr [di+cmyk_list]
      inc     word ptr [bp-08h]
      jmp     word ptr L326
15     L324:
      mov     di, word ptr [bp-06h]
      sal     di, 04h
      fldi    cs:word ptr L10011
      faddf   word ptr [di+cmyk_list+08h]
      fstpf   word ptr [di+cmyk_list+08h]
20     add     word ptr rgb_listLength, 03h
      fwait
      leave
      pop     di
      pop     si
25     ret
      public getmat
getmat:
      strings
30
      L348:
      db      0ah
      db      020h
      db      07ah
35     db      073h
      db      06fh
      db      06ch
      db      076h
      db      065h
40     db      020h
      db      065h
      db      072h
      db      072h
      db      06fh
      db      072h
45     db      020h

```

50

55

```

    db      02dh
    db      020h
    db      063h
5    db      06fh
    db      064h
    db      065h
    db      020h
    db      03dh
10   db      020h
    db      025h
    db      064h
    db      00h

    code

15   push    si
    push    di
    enter   0d0h, 00h
    mov     word ptr [bp-02h], 00h
20   L330:   cmp     word ptr [bp-02h], 04h
        jl      word ptr L20109
        jmp     word ptr L328
    L20109:  mov     ax, word ptr [bp-02h]
        mov     word ptr [bp-04h], ax
25   L333:   cmp     word ptr [bp-04h], 04h
        jl      word ptr L20110
        jmp     word ptr L331
30   L20110: fldz
        fstpd   word ptr [bp-090h]
        mov     word ptr [bp-06h], 00h
35   L336:   mov     ax, word ptr [bp-06h]
        cmp     ax, word ptr rgb_listlength
        jge     word ptr L334
        mov     si, word ptr [bp-06h]
40   sal     si, 02h
        add     si, word ptr [bp-04h]
        sal     si, 02h
        add     si, word ptr w
        mov     di, word ptr [bp-06h]
45   sal     di, 02h

```

50

55

```

5      add     di, word ptr [bp-02h]
      sal     di, 02h
      add     di, word ptr W
      fldf    word ptr [di]
      fmul    word ptr [si]
      fadd    word ptr [bp-090h]
      fstpd   word ptr [bp-090h]
      inc     word ptr [bp-06h]
10     jmp     word ptr L336

      L334:
      mov     di, word ptr [bp-02h]
      sal     di, 02h
      add     di, word ptr [bp-04h]
      sal     di, 03h
15     add     di, bp
      fldd    word ptr [bp-090h]
      fstpd   word ptr [di-088h]
      mov     ax, word ptr [bp-04h]
      cmp     ax, word ptr [bp-02h]
20     jle     word ptr L337
      mov     di, word ptr [bp-04h]
      sal     di, 02h
      add     di, word ptr [bp-02h]
      sal     di, 03h
25     add     di, bp
      fldd    word ptr [bp-090h]
      fstpd   word ptr [di-088h]

      L337:
      inc     word ptr [bp-04h]
30     jmp     word ptr L333

      L331:
      inc     word ptr [bp-02h]
      jmp     word ptr L330

      L328:
35     mov     word ptr [bp-02h], 00h

      L340:
      cmp     word ptr [bp-02h], 04h
      jl      word ptr L20111
      jmp     word ptr L338

      L20111:
40     mov     word ptr [bp-04h], 00h

      L343:
      cmp     word ptr [bp-04h], 04h
      jge     word ptr L341
      fldz
45

50

55

```

```

                    fstpd   word ptr [bp-090h]
                    mov     word ptr [bp-06h], 00h
5      L346:
                    mov     ax, word ptr [bp-06h]
                    cmp     ax, word ptr rgb_listlength
                    jge     word ptr L344
                    mov     bx, word ptr [bp-06h]
10     sal            bx, 02h
                    add     bx, word ptr weight_factor
                    mov     di, word ptr [bp-02h]
                    sal     di, 02h
                    mov     si, word ptr [bp-06h]
                    sal     si, 04h
15     add            si, di
                    mov     di, word ptr [bp-06h]
                    sal     di, 02h
                    add     di, word ptr [bp-04h]
                    sal     di, 02h
20     add            di, word ptr w
                    fldf    word ptr [di]
                    fmul    word ptr [si+cmyk_list]
                    fmul    word ptr [bx]
                    fadd    word ptr [bp-090h]
25     fstpd         word ptr [bp-090h]
                    inc     word ptr [bp-06h]
                    jmp     word ptr L346
      L344:
                    mov     di, word ptr [bp-04h]
30     sal            di, 03h
                    add     di, bp
                    fldd    word ptr [bp-090h]
                    fstpd   word ptr [di-0b0h]
                    inc     word ptr [bp-04h]
35     jmp            word ptr L343
      L341:
                    lea     ax, word ptr [bp-0d0h]
                    push    ax
                    push    04h
40     lea            ax, word ptr [bp-0b0h]
                    push    ax
                    lea     ax, word ptr [bp-088h]
                    push    ax
                    call    zsolve
                    add     sp, 08h
45     mov            word ptr [bp-08h], ax

```

50

55

```

5      cmp     word ptr [bp-08h], 00h
      jge     word ptr L347
      push    ax
      push    offset L348
      call    printf
      add     sp, 04h
      mov     ax, -0ah
10     jmp     word ptr L327
      L347:
      L351:    mov     word ptr [bp-04h], 00h
      cmp     word ptr [bp-04h], 04h
      jge     word ptr L349
15     mov     di, word ptr [bp-04h]
      sal     di, 03h
      add     di, bp
      fldd    word ptr [di-0d0h]
      mov     si, word ptr [bp-04h]
20     sal     si, 03h
      mov     di, word ptr [bp-02h]
      sal     di, 05h
      add     di, si
      fstpd   word ptr [di+matrix]
25     inc     word ptr [bp-04h]
      jmp     word ptr L351
      L349:
      inc     word ptr [bp-02h]
      jmp     word ptr L340
30     L338:
      sub     ax, ax
      L327:
      fwait
      leave
35     pop     di
      pop     si
      ret
      public getfew
getfew:
40     push    si
      push    di
      enter   03ah, 00h
      mov     word ptr [bp-0ah], 03h
      cmp     word ptr k flag, 00h
      je      word ptr L353
45     mov     word ptr [bp-0ah], 04h

```

50

55

```

L353:      mov     word ptr [bp-04h], 00h
5
L356:      cmp     word ptr [bp-04h], 04h
           jge     word ptr L354
           mov     di, word ptr [bp-04h]
           sal     di, 03h
           add     di, bp
10          fldz
           fstpd   word ptr [di-032h]
           inc     word ptr [bp-04h]
           jmp     word ptr L356

L354:      cmp     word ptr k flag, 00h
           jne     word ptr L357
           fldi    cs:word ptr L10008
           fstpd   word ptr [bp-01ah]
15

L357:      mov     word ptr [bp-02h], 00h
20
L360:      mov     ax, word ptr [bp-02h]
           cmp     ax, word ptr rgb_listlength
           jl      word ptr L20112
           jmp     word ptr L358
25

L20112:    mov     di, word ptr [bp-02h]
           sal     di, 01h
           add     di, word ptr rgb_list
           mov     ax, word ptr [di]
           mov     word ptr [bp-08h], ax
           dec     ax
           imul    word ptr [bp-0ah]
           cwd
           idiv    cs:word ptr L10003
           mov     word ptr [bp-06h], ax
           mov     word ptr [bp-04h], 00h
35

L363:      mov     ax, word ptr [bp-04h]
           cmp     ax, word ptr [bp-0ah]
           jge     word ptr L361
           mov     di, word ptr [bp-04h]
           add     di, word ptr [bp-06h]
           sal     di, 03h
           add     di, word ptr A
45          fldd   word ptr [di]

50

55

```

```

5      mov     si, word ptr [bp-04h]
      sal     si, 02h
      mov     di, word ptr [bp-02h]
      sal     di, 04h
      add     di, si
      fstpf   word ptr [di+cmyk_list]
      mov     di, word ptr [bp-04h]
10     add     di, word ptr [bp-06h]
      sal     di, 03h
      add     di, word ptr A
      fldd    word ptr [di]
      mov     di, word ptr [bp-04h]
15     sal     di, 03h
      add     di, bp
      fadd    word ptr [di-032h]
      fstpd   word ptr [di-032h]
      inc     word ptr [bp-04h]
20     jmp     word ptr L363

      L361:
      cmp     word ptr k_flag, 00h
      jne     word ptr L364
      mov     di, word ptr [bp-02h]
25     sal     di, 04h
      fldi    cs:word ptr L10008
      fstpf   word ptr [di+cmyk_list+0ch]
      L364:
      inc     word ptr [bp-02h]
      jmp     word ptr L360
30     L358:
      fldi    word ptr rgb_listlength
      fstpd   word ptr [bp-03ah]
      fldd    cs:word ptr L10005
      fddivd  word ptr [bp-03ah]
35     fstpd   word ptr [bp-012h]
      mov     word ptr [bp-04h], 00h
      L367:
      mov     ax, word ptr [bp-04h]
      cmp     ax, word ptr [bp-0ah]
40     jge     word ptr L365
      mov     di, word ptr [bp-04h]
      sal     di, 03h
      add     di, bp
      fldd    word ptr [bp-012h]
45     fmuld   word ptr [di-032h]
      fstpd   word ptr [di-032h]

50

55

```

```

    inc     word ptr [bp-04h]
    jmp     word ptr L367
L365:
5      mov     word ptr [bp-02h], 00h
L370:
    cmp     word ptr [bp-02h], 04h
    jge     word ptr L352
    mov     di, word ptr [bp-02h]
10     sal     di, 03h
    add     di, bp
    fldd    word ptr [di-032h]
    mov     di, word ptr [bp-02h]
    sal     di, 05h
    fstpd   word ptr [di+matrix]
15     mov     word ptr [bp-04h], 01h
L373:
    cmp     word ptr [bp-04h], 04h
    jge     word ptr L371
    mov     si, word ptr [bp-04h]
20     sal     si, 03h
    mov     di, word ptr [bp-02h]
    sal     di, 05h
    add     di, si
    fldz
25     fstpd   word ptr [di+matrix]
    inc     word ptr [bp-04h]
    jmp     word ptr L373
L371:
    inc     word ptr [bp-02h]
30     jmp     word ptr L370
L352:
    fwait
    leave
    pop     di
    pop     si
35     ret
    public getlut
getlut:
    push    si
    push    di
40     enter   062h, 00h
    fldd    cs:word ptr L10005
    fstpd   word ptr [bp-03ah]
    mov     si, word ptr [bp+0ah]
    sal     si, 01h
45
50
55

```

```

5      mov     di, word ptr [bp+08h]
      mov     ax, word ptr [di]
      sub     ax, word ptr [si+g_range]
      mov     word ptr [bp-02h], -ax
L377:
      mov     si, word ptr [bp+0ah]
      sal     si, 01h
10     mov     di, word ptr [bp+08h]
      mov     ax, word ptr [di]
      add     ax, word ptr [si+g_range]
      cmp     ax, word ptr [bp-02h]
      jge     word ptr L20114
      jmp     word ptr L374
15     L20114:  cmp     word ptr [bp-02h], 00h
      jge     word ptr L20115
      jmp     word ptr L378
L20115:
20     cmp     word ptr [bp-02h], 0100h
      jle     word ptr L20116
      jmp     word ptr L378
L20116:
25     mov     ax, word ptr [bp-02h]
      sar     ax, 04h
      mov     word ptr [bp-08h], ax
      mov     word ptr [bp-02h]
      fstpd   word ptr [bp-032h]
      mov     si, word ptr [bp+0ah]
30     sal     si, 01h
      mov     ax, word ptr [di+02h]
      sub     ax, word ptr [si+g_range]
      mov     word ptr [bp-04h], ax
L381:
35     mov     si, word ptr [bp+0ah]
      sal     si, 01h
      mov     di, word ptr [bp+08h]
      mov     ax, word ptr [di+02h]
      add     ax, word ptr [si+g_range]
40     cmp     ax, word ptr [bp-04h]
      jge     word ptr L20117
      jmp     word ptr L378
L20117:
45     cmp     word ptr [bp-04h], 00h
      jge     word ptr L20118
      jmp     word ptr L382
50
55

```

```

L20118:
5      cmp      word ptr [bp-04h], 0100h
      jle      word ptr L20119
      jmp      word ptr L382
L20119:
      mov      ax, word ptr [bp-04h]
      sar      ax, 04h
10     mov      word ptr [bp-0ah], ax
      fldi     word ptr [bp-04h]
      fstpd    word ptr [bp-02ah]
      mov      si, word ptr [bp+0ah]
      sal      si, 01h
15     mov      ax, word ptr [di+04h]
      sub      ax, word ptr [si+g_range]
      mov      word ptr [bp-06h], ax
L385:
      mov      si, word ptr [bp+0ah]
      sal      si, 01h
20     mov      di, word ptr [bp+08h]
      mov      ax, word ptr [di+04h]
      add      ax, word ptr [si+g_range]
      cmp      ax, word ptr [bp-06h]
      jge      word ptr L20120
25     jmp      word ptr L382
L20120:
      cmp      word ptr [bp-06h], 00h
      jge      word ptr L20121
      jmp      word ptr L386
30     L20121:
      cmp      word ptr [bp-06h], 0100h
      jle      word ptr L20122
      jmp      word ptr L386
L20122:
35     mov      ax, word ptr [bp-06h]
      sar      ax, 04h
      mov      word ptr [bp-0ch], ax
      fldi     word ptr [bp-06h]
      fstpd    word ptr [bp-022h]
40     imul     ax, word ptr [bp-0ah], 011h
      mov      di, ax
      imul     ax, word ptr [bp-0ch], 0121h
      add      ax, di
      add      ax, word ptr [bp-08h]
45     mov      word ptr [bp-012h], ax
      mov      di, word ptr [bp+08h]

```

50

55

```

5      mov     ax, word ptr [di]
      sub     ax, word ptr [bp-02h]
      mov     word ptr [bp-018h], ax
      mov     ax, word ptr [di+02h]
      sub     ax, word ptr [bp-04h]
      mov     word ptr [bp-016h], ax
      mov     ax, word ptr [di+04h]
10     sub     ax, word ptr [bp-06h]
      mov     word ptr [bp-014h], ax
      mov     word ptr [bp-010h], 00h
      L389:
      cmp     word ptr [bp-010h], 03h
15     jge     word ptr L387
      mov     di, word ptr [bp-010h]
      sal     di, 01h
      add     di, bp
      cmp     word ptr [di-018h], 00h
20     jge     word ptr L390
      mov     di, word ptr [bp-010h]
      sal     di, 01h
      add     di, bp
      mov     ax, word ptr [di-018h]
25     neg     ax
      mov     di, word ptr [bp-010h]
      sal     di, 01h
      add     di, bp
      mov     word ptr [di-018h], ax
      L390:
30     mov     di, word ptr [bp-010h]
      sal     di, 01h
      add     di, bp
      mov     ax, word ptr [di-018h]
      sar     ax, 04h
35     mov     di, word ptr [bp-010h]
      sal     di, 01h
      add     di, bp
      mov     word ptr [di-018h], ax
      inc     word ptr [bp-010h]
40     jmp     word ptr L389
      L387:
      mov     ax, word ptr [bp-018h]
      cmp     ax, word ptr [bp-016h]
      jg      word ptr L20113
45     mov     ax, word ptr [bp-016h]
      L20113:
50
55

```

```

5      mov     word ptr [bp-01ah], ax
      mov     ax, word ptr [bp-014h]
      cmp     ax, word ptr [bp-01ah]
      jle     word ptr L393
      mov     word ptr [bp-01ah], ax
L393:
      mov     si, word ptr [bp+0ah]
10     sal     si, 03h
      mov     di, word ptr [bp-01ah]
      sal     di, 05h
      add     di, si
      fldd    word ptr [di+f2]
15     fstpd   word ptr [bp-062h]
      fldd    word ptr [bp-062h]
      fcompd  word ptr epsilon
      call    cfcc
      jae     word ptr L20123
20     jmp     word ptr L386
L20123:
      mov     di, word ptr [bp-012h]
      sal     di, 03h
      add     di, word ptr weight_vec
25     fldd    word ptr [bp-062h]
      fadd    word ptr [di]
      fstpd   word ptr [di]
      mov     word ptr [bp-0eh], 00h
L398:
      cmp     word ptr [bp-0eh], 04h
30     jl      word ptr L20124
      jmp     word ptr L396
L20124:
      mov     di, word ptr [bp-0eh]
      sal     di, 03h
35     add     di, bp
      fldz
      fstpd   word ptr [di-05ah]
      mov     word ptr [bp-010h], 00h
L401:
40     cmp     word ptr [bp-010h], 04h
      jge     word ptr L399
      mov     bx, word ptr [bp-010h]
      sal     bx, 03h
      add     bx, bp
45     mov     si, word ptr [bp-010h]
      sal     si, 03h
50
55

```

```

5      mov     di, word ptr [bp-0eh]
      sal     di, 05h
      add     di, si
      fldd    word ptr [di+matrix]
      fmuld   word ptr [bx-03ah]
      mov     di, word ptr [bp-0eh]
      sal     di, 03h
10     add     di, bp
      fadd    word ptr [di-05ah]
      fstpd   word ptr [di-05ah]
      inc     word ptr [bp-010h]
      jmp     word ptr L401
15     L399:
      mov     di, word ptr [bp-0eh]
      sal     di, 03h
      add     di, bp
      fldi    word ptr lowlimit
      fcompd  word ptr [di-05ah]
20     call    cfcc
      jbe     word ptr L402
      mov     di, word ptr [bp-0eh]
      sal     di, 03h
      add     di, bp
25     fldi    word ptr lowlimit
      fstpd   word ptr [di-05ah]
      L402:
      mov     di, word ptr [bp-0eh]
      sal     di, 03h
      add     di, bp
30     fldi    word ptr highlimit
      fcompd  word ptr [di-05ah]
      call    cfcc
      jae     word ptr L403
      mov     di, word ptr [bp-0eh]
35     sal     di, 03h
      add     di, bp
      fldi    word ptr highlimit
      fstpd   word ptr [di-05ah]
      L403:
40     inc     word ptr [bp-0eh]
      jmp     word ptr L398
      L396:
45     mov     di, word ptr [bp-012h]
      sal     di, 03h
      add     di, word ptr clut
50
55

```

```

5      fldd    word ptr [bp-062h]
      fmuld   word ptr [bp-05ah]
      fadd    word ptr [di]
      fstpd   word ptr [di]
      mov     di, word ptr [bp-012h]
      sal     di, 03h
      add     di, word ptr mlut
      fldd    word ptr [bp-062h]
10     fmuld   word ptr [bp-052h]
      fadd    word ptr [di]
      fstpd   word ptr [di]
      mov     di, word ptr [bp-012h]
      sal     di, 03h
      add     di, word ptr ylut
15     fldd    word ptr [bp-062h]
      fmuld   word ptr [bp-04ah]
      fadd    word ptr [di]
      fstpd   word ptr [di]
      mov     di, word ptr [bp-012h]
20     sal     di, 03h
      add     di, word ptr klut
      fldd    word ptr [bp-062h]
      fmuld   word ptr [bp-042h]
      fadd    word ptr [di]
25     fstpd   word ptr [di]
      L386:
      add     word ptr [bp-06h], 010h
      jmp     word ptr L385
      L382:
30     add     word ptr [bp-04h], 010h
      jmp     word ptr L381
      L378:
      add     word ptr [bp-02h], 010h
      jmp     word ptr L377
35     L374:
      fwait
      leave
      pop     di
      pop     si
40     ret
      public growtree
      growtree:
      strings
45
50
55

```

L427:

```

5      db      020h
      db      0ah
      db      020h
      db      074h
      db      072h
      db      065h
10     db      065h
      db      020h
      db      06fh
      db      076h
      db      065h
      db      072h
15     db      066h
      db      06ch
      db      06fh
      db      077h
      db      020h
20     db      00h

```

code

```

25     push     si
      push     di
      enter    016h, 00h
      mov      di, word ptr [bp+08h]
      mov      ax, word ptr [di+02h]
      mov      word ptr [bp-0eh], ax
30     cmp      word ptr [bp-0eh], 07h
      jle      word ptr L405
      L20129:
      sub      ax, ax
      jmp      word ptr L404
35     L405:
      mov      word ptr [bp-014h], 00h
      L408:
      cmp      word ptr [bp-014h], 03h
      jl       word ptr L20130
40     jmp      word ptr L406
      L20130:
      mov      di, word ptr [bp-014h]
      add      di, word ptr [bp+0ah]
      sal      di, 03h
      add      di, word ptr list
45     fldd     word ptr [di]

```

50

55

```

fadd    cs:word ptr L10006
call    dp87
call    idcvt
5      add    sp, 08h
mov     di, word ptr [bp-014h]
sal     di, 01h
add     di, bp
mov     word ptr [di-06h], ax
10     mov     di, word ptr [bp-014h]
sal     di, 01h
add     di, bp
mov     ax, word ptr [di-06h]
cmp     ax, word ptr maxthresh
15     jg      word ptr L20129
mov     di, word ptr [bp-014h]
sal     di, 01h
add     di, bp
mov     ax, word ptr [di-06h]
20     cmp     ax, word ptr minthresh
jl      word ptr L20129
mov     di, word ptr [bp-014h]
sal     di, 01h
add     di, bp
25     mov     ax, word ptr [di-06h]
cmp     ax, 0ffh
jle     word ptr L410
mov     di, word ptr [bp-014h]
sal     di, 01h
add     di, bp
30     mov     word ptr [di-06h], 0ffh
L410:
mov     di, word ptr [bp-014h]
sal     di, 01h
add     di, bp
35     cmp     word ptr [di-06h], 00h
jge     word ptr L411
mov     di, word ptr [bp-014h]
sal     di, 01h
add     di, bp
40     mov     word ptr [di-06h], 00h
L411:
inc     word ptr [bp-014h]
jmp     word ptr L408
L406:
45     mov     ax, 07h

```

50

55

```

5          sub    ax, word ptr [bp-0eh]
           mov    word ptr [bp-010h], ax
L414:
           cmp    word ptr [bp-010h], 00h
           jl     word ptr L412
           mov    word ptr [bp-012h], 00h
10          mov    word ptr [bp-014h], 00h
L417:
           cmp    word ptr [bp-014h], 03h
           jge    word ptr L415
           mov    di, word ptr [bp-014h]
           sal    di, 01h
           add    di, bp
           mov    ax, word ptr [di-06h]
           mov    cx, word ptr [bp-010h]
           sar    ax, cl
           and    ax, 01h
15          mov    cx, word ptr [bp-014h]
           sal    ax, cl
           add    word ptr [bp-012h], ax
           inc    word ptr [bp-014h]
           jmp    word ptr L417
20          L415:
           mov    di, word ptr [bp-012h]
           sal    di, 01h
           add    di, word ptr [bp+08h]
           cmp    word ptr [di+04h], 00h
           jle    word ptr L412
           mov    di, word ptr [bp-012h]
           sal    di, 01h
           add    di, word ptr [bp+08h]
           imul   ax, word ptr [di+04h], 014h
           add    ax, word ptr root
           mov    word ptr [bp+08h], ax
           dec    word ptr [bp-010h]
           jmp    word ptr L414
25          L412:
           mov    di, word ptr [bp+08h]
           mov    ax, word ptr [di+02h]
           mov    word ptr [bp-0eh], ax
           mov    di, word ptr [bp-012h]
           sal    di, 01h
           add    di, word ptr [bp+08h]
           cmp    word ptr [di+04h], 00h
           jne    word ptr L420
30          L420:
           mov    di, word ptr [bp+08h]
           mov    ax, word ptr [di+02h]
           mov    word ptr [bp-0eh], ax
           mov    di, word ptr [bp-012h]
           sal    di, 01h
           add    di, word ptr [bp+08h]
           cmp    word ptr [di+04h], 00h
           jne    word ptr L420
35          L420:
           mov    di, word ptr [bp+08h]
           mov    ax, word ptr [di+02h]
           mov    word ptr [bp-0eh], ax
           mov    di, word ptr [bp-012h]
           sal    di, 01h
           add    di, word ptr [bp+08h]
           cmp    word ptr [di+04h], 00h
           jne    word ptr L420
40          L420:
           mov    di, word ptr [bp+08h]
           mov    ax, word ptr [di+02h]
           mov    word ptr [bp-0eh], ax
           mov    di, word ptr [bp-012h]
           sal    di, 01h
           add    di, word ptr [bp+08h]
           cmp    word ptr [di+04h], 00h
           jne    word ptr L420
45          L420:
           mov    di, word ptr [bp+08h]
           mov    ax, word ptr [di+02h]
           mov    word ptr [bp-0eh], ax
           mov    di, word ptr [bp-012h]
           sal    di, 01h
           add    di, word ptr [bp+08h]
           cmp    word ptr [di+04h], 00h
           jne    word ptr L420
50          L420:
           mov    di, word ptr [bp+08h]
           mov    ax, word ptr [di+02h]
           mov    word ptr [bp-0eh], ax
           mov    di, word ptr [bp-012h]
           sal    di, 01h
           add    di, word ptr [bp+08h]
           cmp    word ptr [di+04h], 00h
           jne    word ptr L420
55          L420:
           mov    di, word ptr [bp+08h]
           mov    ax, word ptr [di+02h]
           mov    word ptr [bp-0eh], ax
           mov    di, word ptr [bp-012h]
           sal    di, 01h
           add    di, word ptr [bp+08h]
           cmp    word ptr [di+04h], 00h
           jne    word ptr L420

```

```

5      mov     di, word ptr [bp-012h]
      sal     di, 01h
      add     di, word ptr [bp+08h]
      mov     ax, word ptr [bp+0ah]
      neg     ax
      mov     word ptr [di+04h], ax
      jmp     word ptr L20129

10     L420:   mov     di, word ptr [bp-012h]
      sal     di, 01h
      add     di, word ptr [bp+08h]
      mov     ax, word ptr [di+04h]
      neg     ax
15     mov     word ptr [bp-016h], ax
      mov     word ptr [bp-014h], 00h

      L424:   cmp     word ptr [bp-014h], 03h
      jge     word ptr L422
      mov     di, word ptr [bp-014h]
      add     di, word ptr [bp-016h]
      sal     di, 03h
      add     di, word ptr list
      fldd    word ptr [di]
25     fadd    cs:word ptr L10006
      call    dp87
      call    idcv
      add     sp, 08h
      mov     di, word ptr [bp-014h]
30     sal     di, 01h
      add     di, bp
      mov     word ptr [di-0ch], ax
      inc     word ptr [bp-014h]
      jmp     word ptr L424

35     L422:   mov     ax, word ptr [bp-06h]
      cmp     ax, word ptr [bp-0ch]
      jne     word ptr L425
      mov     ax, word ptr [bp-04h]
40     cmp     ax, word ptr [bp-0ah]
      jne     word ptr L425
      mov     ax, word ptr [bp-02h]
      cmp     ax, word ptr [bp-08h]
      jne     word ptr L425
45     jmp     word ptr L20129

      L425:

```

```

    inc     word ptr treelength
    mov     ax, word ptr treelength
    cmp     ax, word ptr msize
5   jle     word ptr L426
    push    offset L427
    call    printf
    add     sp, 02h
    jmp     word ptr L20126
10   L426:
    mov     di, word ptr [bp-012h]
    sal     di, 01h
    add     di, word ptr [bp+08h]
    mov     ax, word ptr treelength
15   mov     word ptr [di+04h], ax
    imul    ax, word ptr treelength, 014h
    add     ax, word ptr root
    mov     word ptr [bp+08h], ax
    mov     ax, word ptr [bp-0eh]
    inc     ax
20   mov     di, word ptr [bp+08h]
    mov     word ptr [di+02h], ax
    push    word ptr [bp-016h]
    push    di
    call    growtree
    add     sp, 04h
25   or      ax, ax
    jl      word ptr L20126
    push    word ptr [bp+0ah]
    push    word ptr [bp+08h]
30   call    growtree
    add     sp, 04h
    or      ax, ax
    jl      word ptr L20126
    jmp     word ptr L20129
35   L20126:
    mov     ax, -01h
    L404:
    fwait
    leave
    pop     di
40   pop     si
    ret
    public number_of_sons
number_of_sons:
    push    si
45
50
55

```

```

                    push    di
                    enter   06h, 00h
5                   mov     word ptr [bp-06h], 00h
                    mov     word ptr [bp-02h], 00h
L433:               cmp     word ptr [bp-02h], 08h
                    jge     word ptr L431
                    mov     di, word ptr [bp-02h]
10                  sal     di, 01h
                    add     di, word ptr [bp+08h]
                    mov     ax, word ptr [di+04h]
                    mov     word ptr [bp-04h], ax
                    cmp     word ptr [bp-04h], 00h
15                  jge     word ptr L434
                    inc     word ptr [bp-06h]
                    jmp     word ptr L435
L434:               cmp     word ptr [bp-04h], 00h
                    jle     word ptr L435
20                  imul    ax, word ptr [bp-04h], 014h
                    add     ax, word ptr root
                    push     ax
                    call     number of_sons
                    add     sp, 02h
25                  add     word ptr [bp-06h], ax
L435:               inc     word ptr [bp-02h]
                    jmp     word ptr L433
L431:               mov     ax, word ptr [bp-06h]
                    mov     di, word ptr [bp+08h]
                    mov     word ptr [di], ax
                    mov     ax, word ptr [bp-06h]
30                  leave
                    pop     di
                    pop     si
                    ret
35                  public findleaf
findleaf:           push     si
                    push     di
40                  enter   0ah, 00h
                    mov     word ptr [bp-0ah], 00h
                    mov     ax, word ptr root
45                  L20131:

```

```

5      mov     word ptr [bp-02h], ax
      mov     di, word ptr [bp-02h]
      mov     ax, word ptr [di+02h]
      cmp     ax, word ptr [bp+0ah]
      jge     word ptr L438
      mov     ax, 07h
      sub     ax, word ptr [di+02h]
      mov     word ptr [bp-04h], ax
10     mov     word ptr [bp-06h], 00h
      mov     word ptr [bp-08h], 00h
      L442:
      cmp     word ptr [bp-08h], 03h
      jge     word ptr L440
15     mov     di, word ptr [bp-08h]
      sal     di, 01h
      add     di, word ptr [bp+08h]
      mov     ax, word ptr [di]
      mov     cx, word ptr [bp-04h]
20     sar     ax, cl
      and     ax, 01h
      mov     cx, word ptr [bp-08h]
      sal     ax, cl
      add     word ptr [bp-06h], ax
25     inc     word ptr [bp-08h]
      jmp     word ptr L442
      L440:
      mov     di, word ptr [bp-06h]
      sal     di, 01h
      add     di, word ptr [bp-02h]
30     mov     ax, word ptr [di+04h]
      mov     word ptr [bp-0ah], ax
      cmp     word ptr [bp-0ah], 00h
      jle     word ptr L438
      imul    ax, word ptr [bp-0ah], 014h
35     add     ax, word ptr root
      jmp     word ptr L20131
      L438:
      mov     ax, word ptr [bp-0ah]
      leave
40     pop     di
      pop     si
      ret
      public checkval
checkval:
45     push    si

```

50

55

```

5      push    di
        enter  06h, 00h
        mov    di, 08h
        sub    di, word ptr [bp+0ah]
        mov    ax, -01h
        mov    cx, di
        sal    ax, cl
10     xor     ax, -0100h
        mov    word ptr [bp-02h], ax
        mov    word ptr [bp-04h], 01h
        mov    word ptr [bp-06h], 00h
L448:
15     cmp     word ptr [bp-06h], 03h
        jge    word ptr L446
        mov    di, word ptr [bp-06h]
        add    di, word ptr [bp+0ch]
        sal    di, 03h
        add    di, word ptr list
20     fldd    word ptr [di]
        fadd    cs:word ptr L10006
        call    dp87
        call    idcvt
        add    sp, 08h
25     mov     si, ax
        and    si, word ptr [bp-02h]
        mov    di, word ptr [bp-06h]
        sal    di, 01h
        add    di, word ptr [bp+08h]
        mov    ax, word ptr [di]
30     and     ax, word ptr [bp-02h]
        cmp    ax, si
        je     word ptr L449
        mov    word ptr [bp-04h], 00h
        jmp    word ptr L446
35     L449:
        inc    word ptr [bp-06h]
        jmp    word ptr L448
L446:
40     mov     ax, word ptr [bp-04h]
        fwait
        leave
        pop     di
        pop     si
        ret
45     public readtree

```

50

55

```

readtree:
    push    si
    push    di
    enter   04h, 00h
    mov     word ptr [bp-02h], 00h
L453:      cmp     word ptr [bp-02h], 08h
    jge     word ptr L450
    mov     di, word ptr [bp-02h]
    sal     di, 01h
    add     di, word ptr [bp+08h]
    mov     ax, word ptr [di+04h]
    mov     word ptr [bp-04h], ax
    cmp     word ptr [bp-04h], 00h
    jge     word ptr L454
    mov     di, word ptr rgb_listlength
    inc     word ptr rgb_listlength
    sal     di, 01h
    add     di, word ptr rgb_list
    neg     ax
    mov     word ptr [di], ax
    jmp     word ptr L455
L454:      cmp     word ptr [bp-04h], 00h
    jle     word ptr L455
    imul    ax, word ptr [bp-04h], 014h
    add     ax, word ptr root
    push    ax
    call    readtree
    add     sp, 02h
L455:      inc     word ptr [bp-02h]
    jmp     word ptr L453
L450:      leave
    pop     di
    pop     si
    ret

```

```

                                name CRTLUTMAIN
5                                impure

                                mrk_fname:

                                strings

10                                L1:
                                    db      06dh
                                    db      072h
                                    db      06bh
                                    db      02eh
15                                db      073h
                                    db      063h
                                    db      072h
                                    db      00h

20                                impure

                                    dw      L1

                                bss

25                                public LIGHT0
                                LIGHT0: db      02h dup(0)
                                    public LIGHT1
30                                LIGHT1: db      02h dup(0)
                                    public LIGHT2
                                LIGHT2: db      02h dup(0)
                                    public LIGHT3
35                                LIGHT3: db      02h dup(0)
                                    public DARK0
                                DARK0:  db      02h dup(0)
                                    public DARK1
40                                DARK1: db      02h dup(0)
                                    public DARK2
                                DARK2:  db      02h dup(0)
45
50
55
```

```

5      DARK3:      public DARK3
                        db      02h dup(0)
                        public D_12
D_12:      db      02h dup(0)
                        public W_12
10     W_12:      db      02h dup(0)
                        public GAIN_LEVEL_1
GAIN_LEVEL_1:      db      02h dup(0)
                        public LUT_TYPE
15     LUT_TYPE:      db      02h dup(0)
                        public buf12tol2
buf12tol2:      db      06002h dup(0)
20                        public grad8bit1
grad8bit1:      db      0800h dup(0)
scan_tok:      db      02h dup(0)
25     scan_token:      db      02h dup(0)
                        db      02h dup(0)
root_token:      db      02h dup(0)
30     scid_token:      db      02h dup(0)
scanner1_sem:      db      02h dup(0)
scanner2_sem:      db      02h dup(0)
35                        public sc_curnt_sem
sc_curnt_sem:      db      02h dup(0)
                        public sc_other_sem
sc_other_sem:      db      02h dup(0)
40     scanner1_rdy:      db      02h dup(0)
                        db      02h dup(0)
scanner2_rdy:      db      02h dup(0)
45     scl_rdy_ptr:      db      02h dup(0)

```

50

55

```

sc2_rdy_ptr:
    db      02h dup(0)
sc_rdy_ptr:
    db      02h dup(0)
scid_pointer:
    db      02h dup(0)
appl_pointer:
    db      02h dup(0)
resp_pointer:
    db      02h dup(0)
obj_token:
    db      02h dup(0)
response_ptr:
    db      02h dup(0)
histogram_fname:
    db      064h dup(0)

    impure

scltok:
    db      0ah
    db      053h
    db      043h
    db      041h
    db      04eh
    db      031h
    db      054h
    db      04fh
    db      04bh
    db      00h
sc2tok:
    db      0ah
    db      053h
    db      043h
    db      041h
    db      04eh
    db      032h
    db      054h
    db      04fh
    db      04bh
    db      00h
scidtok:
    db      0ah
    db      053h
    db      043h

```

EP 0 475 554 A2

		db	041h
		db	04eh
		db	049h
5		db	044h
		db	054h
		db	04fh
		db	04bh
		db	00h
10	smbx:		
		db	0ah
		db	053h
		db	043h
		db	041h
15		db	04eh
		db	04dh
		db	041h
		db	049h
		db	04ch
20		db	042h
		db	058h
		db	00h
	srbx:		
		db	0ah
25		db	053h
		db	043h
		db	041h
		db	04eh
		db	052h
		db	053h
30		db	050h
		db	04dh
		db	042h
		db	058h
		db	00h
35	lmbx:		
		db	0ah
		db	04ch
		db	045h
		db	041h
40		db	044h
		db	04dh
		db	041h
		db	049h
		db	04ch
45		db	042h

50

55

EP 0 475 554 A2

		db	058h
		db	00h
	1rbx:		
5		db	0ah
		db	04ch
		db	045h
		db	041h
		db	044h
10		db	052h
		db	053h
		db	050h
		db	04dh
		db	042h
15		db	058h
		db	00h
	sprm:		
		db	0ah
		db	053h
20		db	043h
		db	041h
		db	04eh
		db	05fh
		db	050h
		db	041h
25		db	052h
		db	041h
		db	04dh
		db	00h
	aplt:		
30		db	0ah
		db	041h
		db	050h
		db	050h
		db	04ch
35		db	05fh
		db	054h
		db	04fh
		db	04bh
		db	045h
40		db	04eh
		db	00h
	rspt:		
		db	0ah
		db	052h
45		db	045h
50			
55			

EP 0 475 554 A2

		db	053h
		db	050h
5		db	05fh
		db	054h
		db	04fh
		db	04bh
		db	045h
		db	04eh
10		db	00h
	sclsem:		
		db	0ah
	6~	db	053h
		db	043h
15		db	041h
		db	04eh
		db	045h
		db	052h
		db	031h
20		db	053h
		db	045h
		db	04dh
		db	00h
	sc2sem:		
25		db	0ah
		db	053h
		db	043h
		db	041h
		db	04eh
		db	045h
30		db	052h
		db	032h
		db	053h
		db	045h
		db	04dh
35		db	00h
	sclrdy:		
		db	0ah
		db	053h
		db	043h
40		db	041h
		db	04eh
		db	045h
		db	052h
		db	031h
45		db	052h
50			
55			

EP 0 475 554 A2

	db	044h
	db	059h
	db	00h
5	sc2rdy:	
	db	0ah
	db	053h
	db	043h
	db	041h
10	db	04eh
	db	045h
	db	052h
	db	032h
	db	052h
15	db	044h
	db	059h
	db	00h
	startup_name:	
	db	0ah
20	db	053h
	db	054h
	db	052h
	db	054h
	db	055h
25	db	050h
	db	054h
	db	04bh
	db	031h
	db	0ah
	db	053h
30	db	054h
	db	052h
	db	054h
	db	055h
	db	050h
35	db	054h
	db	04bh
	db	032h
	interactive_name:	
	db	0ah
40	db	049h
	db	04eh
	db	054h
	db	052h
	db	043h
45	db	054h

50

55

EP 0 475 554 A2

	db	054h
	db	04bh
	db	031h
5	db	0ah
	db	049h
	db	04eh
	db	054h
	db	052h
10	db	043h
	db	054h
	db	054h
	db	04bh
	db	032h
15	scan_name:	
	db	09h
	db	053h
	db	043h
	db	04eh
20	db	054h
	db	04fh
	db	04bh
	db	045h
	db	04eh
25	db	031h
	db	09h
	db	053h
	db	043h
	db	04eh
30	db	054h
	db	04fh
	db	04bh
	db	045h
	db	04eh
	db	032h
35	exit_twins_name:	
	db	09h
	db	045h
	db	058h
	db	049h
40	db	054h
	db	054h
	db	057h
	db	049h
	db	04eh
45	db	053h

50

55

```

                                bss

scanner_id:
5      db      02h dup(0)
      public s_p
s_p:
      db      0126h dup(0)
      public ps_p
10     ps_p:
      db      0a0h dup(0)
      public files
files:
      db      010h dup(0)
      public ct_struct
15     ct_struct:
      db      08c4h dup(0)
      public smart_crt
smart_crt:
20     db      096ch dup(0)
      public ct_path
ct_path:
      db      08c2h dup(0)
      public glpar
glpar:
25     db      024h dup(0)
      public new_setup_pos
new_setup_pos:
      db      070h dup(0)
      public def_setup_pos
30     def_setup_pos:
      db      070h dup(0)
      public new_grad
new_grad:
      db      012f7h dup(0)
      public def_grad
35     def_grad:
      db      012f7h dup(0)
      public lutid
lutid:
40     db      02h dup(0)
      public def_lut
def_lut:
      db      02h dup(0)
      public def_rgb12to12

```

```

5      def_rgb12to12:
          db      02h dup(0)
          public def_LUT_TYPE
      def_LUT_TYPE:
          db      02h dup(0)

          impure

10      public LUT_TYPE_id
      LUT_TYPE_id:
          dw      014h

          bss

15      public c_p
      c_p:
          db      0a8h dup(0)

          impure

          public exp_num
      exp_num:
          db      0cch
          db      0cch
          db      0cch
          db      03eh

          bss

30      public gcor_lut
      gcor_lut:
          db      02h dup(0)
      tok13d:
          db      02h dup(0)
35      tok23d:
          db      02h dup(0)
      def_c_p:
          db      0a8h dup(0)
          c_p_id:
          db      0a8h dup(0)
40      def_exp_num:
          db      04h dup(0)
      exp_num_id:
          db      04h dup(0)
45      public bef_grad8

```

b

50

55

```

ef_grad8:
    db      0800h dup(0)
5
    code

    public main
main:
10
    strings

L3:
    db      043h
    db      052h
15
    db      054h
    db      05fh
    db      04ch
    db      055h
    db      054h
20
    db      00h

    code

    push    si
    push    di
25
    enter   02h, 00h
    mov     word ptr [bp-02h], 00h
    push    08c4h
    push    offset ct_struct
    call    unstackj
30
    add     sp, 04h
    push    08c2h
    push    offset ct_struct+02h
    push    offset ct_path
    call    blkmv
35
    add     sp, 06h
    mov     ax, word ptr ct_struct
    and     ax, -04000h
    sar     ax, 0eh
    mov     word ptr scanner_id, ax
40
    mov     word ptr scanner_id, 01h
    mov     ax, 0ffh
    mov     word ptr LIGHT3, ax
    mov     word ptr LIGHT2, ax
    mov     word ptr LIGHT1, ax
45
    mov     word ptr LIGHT0, ax

```

50

55

```

sub      ax, ax
mov      word ptr DARK3, ax
5      mov      word ptr DARK2, ax
mov      word ptr DARK1, ax
mov      word ptr DARK0, ax
mov      word ptr rgb12to12, offset buf12to12
call     unit_init
10      call     init_disp
call     InitDmtr
call     load_smart
call     end_disp
mov      word ptr gcor_lut, 00h
15      push     offset L3
call     uimsif
add      sp, 02h
leave
pop      di
pop      si
20      ret
public load_h_i
load_h_i:

strings

25      L8:
db      020h
db      04eh
db      04fh
30      db      020h
db      06dh
db      065h
db      06dh
db      06fh
35      db      072h
db      079h
db      020h
db      066h
db      06fh
40      db      072h
db      020h
db      031h
db      032h
db      074h
45      db      06fh
db      031h

```

50

55

EP 0 475 554 A2

	db	032h
	db	020h
	db	062h
5	db	075h
	db	066h
	db	066h
	db	065h
	db	072h
10	db	020h
	db	0ah
	db	00h
	code	
15		
	strings	
	L9:	
20	db	068h
	db	05fh
	db	069h
	db	00h
	code	
25		
	strings	
	L11:	
30	db	0ah
	db	020h
	db	045h
	db	04eh
	db	044h
35	db	020h
	db	04fh
	db	046h
	db	020h
	db	053h
40	db	043h
	db	041h
	db	04eh
	db	020h
	db	02dh
45	db	020h
50		
55		

```

5          db      052h
          db      047h
          db      042h
          db      020h
          db      0ah
          db      00h

10         code

          strings

15         L12:
          db      043h
          db      052h
          db      054h
          db      05fh
          db      04ch
20         db      055h
          db      054h
          db      00h

          code

25         push    si
          push    di
          enter   02h, 00h
          call    unload_smart
30         push    si
          push    di
          push    es
          push    00h
          lea     ax, word ptr [bp-02h]
          push    ax
35         call    rqcreatesegment
          pop     es
          pop     di
          pop     si
          mov     word ptr tok13d, ax
40         cmp     word ptr [bp-02h], 00h
          je      word ptr L5
          push    00h
          push    00h
          push    00h
45         push    word ptr [bp-02h]

```

50

55

```

    call    handle_exc
    add     sp, 08h
5      L5:   push    00h
        push    word ptr tok13d
        call    buildptr
        add     sp, 04h
        mov     word ptr def_lut, ax
10     push    si
        push    di
        push    es
        push    00h
        lea     ax, word ptr [bp-02h]
15     push    ax
        call    rqcreatesegment
        pop     es
        pop     di
        pop     si
20     mov     word ptr tok23d, ax
        cmp     word ptr [bp-02h], 00h
        je      word ptr L6
        push    00h
        push    00h
25     push    00h
        push    word ptr [bp-02h]
        call    handle_exc
        add     sp, 08h
      L6:   push    00h
30     push    word ptr tok23d
        call    buildptr
        add     sp, 04h
        mov     word ptr lutid, ax
        push    03001h
35     push    02h
        call    calloc
        add     sp, 04h
        mov     word ptr def_rgb12to12, ax
        or      ax, ax
40     jne      word ptr L7
        push    offset L8
        call    printf
        jmp     word ptr L20001
      L7:   push    word ptr def_rgb12to12
45
50
55

```

```

5      push    offset def_LUT_TYPE
      push    offset def_exp_num
      push    offset def_c_p
      push    word ptr def_lut
      call    save_lut
      add     sp, 0ah
      push    offset def_grad
10     call    save_grad
      add     sp, 02h
      call    init_grad
      push    012f7h
      push    offset def_grad
      push    offset new_grad
15     call    blkmv
      add     sp, 06h
      push    0136h
      push    offset int_c_p
      push    offset new_grad
20     call    blkmv
      add     sp, 06h
      push    offset new_grad
      call    load_def_grad
      add     sp, 02h
25     push    offset exp_num_id
      push    offset c_p_id
      push    word ptr lutid
      call    read_lutid
      add     sp, 06h
30     call    init_12to12
      push    word ptr rgb12to12
      push    offset LUT_TYPE_id
      push    offset exp_num_id
      push    offset c_p_id
35     push    word ptr lutid
      call    load_def_lut
      add     sp, 0ah
      push    si
      push    di
      push    es
40     push    word ptr tok23d
      lea     ax, word ptr [bp-02h]
      push    ax
      call    rqdeletesegment
      pop     es
45     pop     di

```

50

55

```

pop      si
push     00h
push     00h
5  push   00h
push     0271ah
call     handle_exc
add      sp, 08h
call     abort_create_lut
10 movb   byte ptr ct_path+057h, 00h
push     08c2h
push     offset ct_path
push     offset ct_struct+02h
call     blkmv
15 add     sp, 06h
push     08c4h
push     offset ct_struct
push     offset smart_crt
call     blkmv
20 add     sp, 06h
push     096ch
push     offset smart_crt
push     04h
push     0ah
25 push     01h
push     offset L9
call     loadjob
add      sp, 0ch
push     08c4h
push     offset smart_crt
30 push     offset ct_struct
call     blkmv
add      sp, 06h
push     08c2h
push     offset ct_struct+02h
35 push     offset ct_path
call     blkmv
add      sp, 06h
mov      word ptr ct_struct, 06h
push     word ptr def_rgb12to12
40 push     offset def_LUT_TYPE
push     offset def_exp_num
push     offset def_c_p
push     word ptr def_lut
call     load_def_lut
45 add      sp, 0ah

```

50

55

```

5      push    offset def_grad
      call    load_def_grad
      add     sp, 02h
      push    si
      push    di
      push    es
      push    word ptr tok13d
10     lea     ax, word ptr [bp-02h]
      push    ax
      call    rqdeletesegment
      pop     es
      pop     di
      pop     si
15     push    word ptr def_rgb12to12
      call    free
      add     sp, 02h
      cmpb    byte ptr ct_path+057h, 00h
20     je      word ptr L10
      push    offset L11
      call    printf
      add     sp, 02h
      push    00h
      push    00h
25     push    00h
      push    0271bh
      call    handle_exc
      add     sp, 08h
      push    0a8h
30     push    offset smart_crt+08c4h
      push    offset c_p
      call    blkmv
      add     sp, 06h
      mov     ax, word ptr c_p+06h
35     mov     word ptr WHITE12, ax
      mov     ax, word ptr c_p
      mov     word ptr DARK12, ax
      L10:
      call    unit_init
40     call    init_disp
      call    InitDmtr
      call    load_smart
      call    end_disp
      lea     ax, word ptr [bp-02h]
45     push    ax
      push    013h

```

50

55

```

5          push    03h
          push    06fh
          call    gksif
          add     sp, 08h
          push    offset L12
          call    uimsif
L20001:
          add     sp, 02h
10         leave
          pop     di
          pop     si
          ret
          public  calib_ter
15         calib_ter:
          push    si
          push    di
          enter   02h, 00h
          lea     ax, word ptr [bp-02h]
          push    ax
20         push    013h
          push    03h
          push    06fh
          call    gksif
          add     sp, 08h
25         lea     ax, word ptr [bp-02h]
          push    ax
          push    03h
          push    03h
          push    06fh
30         call    gksif
          add     sp, 08h
          leave
          pop     di
          pop     si
35         ret
          public  abort_create_lut
          abort_create_lut:
          strings
40
L19:
          db      045h
          db      072h
          db      072h
          db      06fh
45
50
55

```

EP 0 475 554 A2

	db	072h
	db	020h
5	db	069h
	db	06eh
	db	020h
	db	067h
	db	064h
10	db	065h
	db	061h
	db	063h
	db	074h
	db	069h
	db	076h
15	db	020h
	db	021h
	db	021h
	db	020h
20	db	0ah
	db	00h

code

25	strings
----	---------

L23:

	db	045h
	db	072h
30	db	072h
	db	06fh
	db	072h
	db	020h
	db	069h
	db	06eh
35	db	020h
	db	067h
	db	063h
	db	06ch
	db	06fh
40	db	073h
	db	067h
	db	06bh
	db	073h
	db	021h
45	db	021h

50

55

```

    db      020h
    db      0ah
    db      00h
5
    code

    push    si
    push    di
10   enter   02h, 00h
    mov     word ptr [bp-02h], 00h
    cmp     word ptr files, 00h
    je      word ptr L15
    push    offset files
    call     CloseFile
15   add     sp, 02h
    L15:
    call     CloseDmtr
    call     end_bufs
    call     closeuims
20   lea     ax, word ptr [bp-02h]
    push    ax
    push    02h
    push    068h
    call     gksif
25   add     sp, 06h
    cmp     word ptr [bp-02h], 00h
    je      word ptr L16
    cmpb    byte ptr glpar+023h, 00h
    je      word ptr L16
30   push    offset L19
    call     printf
    add     sp, 02h
    L16:
    lea     ax, word ptr [bp-02h]
35   push    ax
    push    02h
    push    06ah
    call     gksif
    add     sp, 06h
40   cmp     word ptr [bp-02h], 00h
    je      word ptr L14
    cmpb    byte ptr glpar+023h, 00h
    je      word ptr L14
    push    offset L23
45   call     printf

```

50

55

```

5      L14:      add      sp, 02h
          leave
          pop      di
          pop      si
          ret
          public exit_job
10     exit_job:
          push     si
          push     di
          push     bp
          mov      bp, sp
          call     unload_smart
          movb     byte ptr ct_path+057h, 00h
          movb     byte ptr ct_path+0828h, 00h
          call     abort_create_lut
          push     08c2h
          push     offset ct_path
          push     offset ct_struct+02h
          call     blkmv
          add      sp, 06h
          mov      word ptr ct_struct, 00h
          push     08c4h
          push     offset ct_struct
          call     returnsj
          add      sp, 04h
          push     00h
          call     exit
          add      sp, 02h
          leave
          pop      di
          pop      si
          ret
          public init_disp
35     init_disp:
          linkage
          L10001:
          dw      0180h
          code
          linkage
45
50
55

```

```

L10002:
5      dw      0200h

      code

      push     si
      push     di
10     enter   0218h, 00h
      mov      word ptr [bp-0206h], 00h
      fldi     cs:word ptr L10001
      fstpf    word ptr [bp-0212h]
      fldi     cs:word ptr L10002
15     fstpf    word ptr [bp-0216h]
      call     InitDma
      call     ginitgks
      fldf     word ptr [bp-0212h]
      fstpf    word ptr [bp-020eh]
      fldf     word ptr [bp-0216h]
20     fstpf    word ptr [bp-020ah]
      lea      ax, word ptr [bp-0218h]
      push     ax
      push     03h
      lea      ax, word ptr [bp-020eh]
25     push     ax
      call     StartTrans
      add      sp, 06h
      cmp      word ptr [bp-0218h], 00h
      jne      word ptr L26
30     lea      ax, word ptr [bp-0218h]
      push     ax
      push     01h
      call     TransFull
      add      sp, 04h
35     cmp      word ptr [bp-0218h], 00h
      jne      word ptr L26
      call     StartMount
      lea      ax, word ptr [bp-0206h]
      push     ax
40     push     00h
      push     00h
      push     00h
      push     00h
      push     00h
45     push     03h

```

50

55

```

5      push    0ah
      push    0143h
      call    gksif
      add     sp, 012h
      lea     ax, word ptr [bp-0218h]
      push    ax
      push    013h
10     push    03h
      push    06fh
      call    gksif
      add     sp, 08h
      L26:
      cmp     word ptr [bp-0218h], 00h
15     je      word ptr L28
      push    00h
      push    00h
      push    00h
      push    word ptr [bp-0218h]
20     call    handle_exc
      add     sp, 08h
      L28:
      mov     word ptr [bp-0202h], 00h
      L31:
      cmp     word ptr [bp-0202h], 0100h
25     jge     word ptr L29
      mov     di, word ptr [bp-0202h]
      sal     di, 01h
      add     di, bp
30     mov     ax, word ptr [bp-0202h]
      mov     word ptr [di-0200h], ax
      mov     word ptr [bp-0204h], 00h
      L34:
      cmp     word ptr [bp-0204h], 04h
35     jge     word ptr L32
      mov     si, word ptr [bp-0202h]
      sal     si, 01h
      mov     di, word ptr [bp-0204h]
      sal     di, 09h
      add     di, si
40     mov     ax, word ptr [bp-0202h]
      mov     word ptr [di+grad8bit], ax
      inc     word ptr [bp-0204h]
      jmp     word ptr L34
      L32:
45     inc     word ptr [bp-0202h]

```

50

55

```

L29:      jmp      word ptr L31
5          lea      ax, word ptr [bp-0218h]
          push     ax
          push     00h
          lea      ax, word ptr [bp-0200h]
          push     ax
10         push     00h
          push     00h
          push     00h
          push     09h
          push     0145h
15         call    gksif
          add      sp, 010h
          lea      ax, word ptr [bp-0218h]
          push     ax
          push     00h
          lea      ax, word ptr [bp-0200h]
20         push     ax
          push     01h
          push     00h
          push     00h
          push     09h
25         push     0145h
          call    gksif
          add      sp, 010h
          lea      ax, word ptr [bp-0218h]
          push     ax
30         push     00h
          lea      ax, word ptr [bp-0200h]
          push     ax
          push     02h
          push     00h
35         push     00h
          push     09h
          push     0145h
          call    gksif
          add      sp, 010h
40         lea      ax, word ptr [bp-0218h]
          push     ax
          push     00h
          lea      ax, word ptr [bp-0200h]
          push     ax
45         push     03h
          push     00h

```

50

55

```

5          push    00h
           push    09h
           push    0145h
           call    gksif
           add     sp, 010h
           fwait
           leave
           pop     di
10          pop     si
           ret
           public end_disp
end_disp:
           push    si
           push    di
15          push    bp
           mov     bp, sp
           call    EndDma
           leave
           pop     di
20          pop     si
           ret
           public set_smart_job_active
set_smart_job_active:
           push    si
           push    di
25          push    bp
           mov     bp, sp
           leave
           pop     di
           pop     si
30          ret
           public load_smart
load_smart:
           strings
35
           L41:
           db      073h
           db      06dh
           db      061h
40          db      072h
           db      074h
           db      079h
           db      00h
45
50
55

```

```

                                code
5
                                strings
                                L43:
10                                db      073h
                                db      06dh
                                db      061h
                                db      072h
                                db      074h
                                db      00h
15                                code
                                push     si
                                push     di
                                enter    04h, 00h
20                                push     si
                                push     di
                                push     es
                                push     03h
                                lea      ax, word ptr [bp-02h]
25                                push     ax
                                call      rqgettasktokens
                                pop      es
                                pop      di
                                pop      si
30                                mov     word ptr root_token, ax
                                push     si
                                push     di
                                push     es
                                call      prisma_token
35                                push     ax
                                push     offset sclsem
                                push     -01h
                                lea      ax, word ptr [bp-02h]
                                push     ax
40                                call      rqlookupobject
                                pop      es
                                pop      di
                                pop      si
                                mov     word ptr scanner1_sem, ax
45                                push     si
                                push     di

```

50

55

```

push    es
call    prisma_token
push    ax
5  push    offset sc2sem
push    -01h
lea     ax, word ptr [bp-02h]
push    ax
call    rqlookupobject
10  pop     es
pop     di
pop     si
mov     word ptr scanner2_sem, ax
push    si
15  push    di
push    es
call    prisma_token
push    ax
push    offset sclrdy
push    -01h
20  lea     ax, word ptr [bp-02h]
push    ax
call    rqlookupobject
pop     es
pop     di
25  pop     si
mov     word ptr scanner1_rdy, ax
push    si
push    di
push    es
30  call    prisma_token
push    ax
push    offset sc2rdy
push    -01h
lea     ax, word ptr [bp-02h]
35  push    ax
call    rqlookupobject
pop     es
pop     di
pop     si
40  mov     word ptr scanner2_rdy, ax
push    00h
push    word ptr scanner1_rdy
call    buildptr
add     sp, 04h
45  mov     word ptr scl_rdy_ptr, ax

```

50

55

```

push    00h
push    word ptr scanner2_rdy
call    buildptr
5      add    sp, 04h
mov     word ptr sc2_rdy_ptr, ax
push    si
push    di
push    es
10     push    0eh
lea     ax, word ptr [bp-02h]
push    ax
call    rqcreatesegment
pop     es
pop     di
15     pop     si
mov     word ptr scan_token, ax
push    00h
push    ax
call    buildptr
20     add    sp, 04h
mov     word ptr scan_tok, ax
push    si
push    di
push    es
25     push    00h
lea     ax, word ptr [bp-02h]
push    ax
call    rqcreatemailbox
pop     es
30     pop     di
pop     si
mov     di, word ptr scan_tok
mov     word ptr [di+02h], ax
push    si
35     push    di
push    es
push    00h
lea     ax, word ptr [bp-02h]
push    ax
40     call    rqcreatemailbox
pop     es
pop     di
pop     si
mov     di, word ptr scan_tok
45     mov     word ptr [di+04h], ax

```

50

55

```

push    si
push    di
push    es
5 push    00h
lea     ax, word ptr [bp-02h]
push    ax
call    rqcreatemailbox
pop     es
10 pop     di
pop     si
mov     di, word ptr scan_tok
mov     word ptr [di+06h], ax
push    si
15 push    di
push    es
push    00h
lea     ax, word ptr [bp-02h]
push    ax
20 call    rqcreatemailbox
pop     es
pop     di
pop     si
mov     di, word ptr scan_tok
mov     word ptr [di+08h], ax
25 push    si
push    di
push    es
push    020h
lea     ax, word ptr [bp-02h]
30 push    ax
call    rqcreatesegment
pop     es
pop     di
pop     si
35 mov     di, word ptr scan_tok
mov     word ptr [di+0ah], ax
push    si
push    di
push    es
40 push    010h
lea     ax, word ptr [bp-02h]
push    ax
call    rqcreatesegment
pop     es
45 pop     di

```

50

55

```

    pop        si
    mov        di, word ptr scan_tok
    mov        word ptr [di+0ch], ax
5   push        si
    push        di
    push        es
    push        02h
    lea        ax, word ptr [bp-02h]
10  push        ax
    call       rqcreatesegment
    pop        es
    pop        di
    pop        si
    mov        word ptr scid_token, ax
15  push        00h
    mov        di, word ptr scan_tok
    push        word ptr [di+0ch]
    call       buildptr
    add        sp, 04h
20  mov        word ptr resp_pointer, ax
    push        00h
    mov        di, word ptr scan_tok
    push        word ptr [di+0ah]
    call       buildptr
    add        sp, 04h
25  mov        word ptr appl_pointer, ax
    push        00h
    push        word ptr scid_token
    call       buildptr
    add        sp, 04h
30  mov        word ptr scid_pointer, ax
    mov        di, word ptr resp_pointer
    mov        word ptr [di+02h], 00h
    push        si
35  push        di
    push        es
    push        04h
    lea        ax, word ptr [bp-02h]
    push        ax
40  call       rqcreatesegment
    pop        es
    pop        di
    pop        si
    mov        di, word ptr scan_tok
45  mov        word ptr [di], ax

```

50

55

```

5      cmp      word ptr scanner_id, 01h
      jne      word ptr L38
      mov      ax, word ptr scanner1_sem
      mov      word ptr sc_curnt_sem, ax
      mov      ax, word ptr scanner2_sem
      mov      word ptr sc_other_sem, ax
10     mov      ax, word ptr sc1_rdy_ptr
      mov      word ptr sc_rdy_ptr, ax
      mov      di, word ptr sc1_rdy_ptr
      mov      word ptr [di], 00h
      mov      di, word ptr scid_pointer
      mov      word ptr [di], 01h
15     push     si
      push     di
      push     es
      push     word ptr root_token
      push     word ptr scan_token
      push     offset sc1tok
20     jmp      word ptr L20007

L38:
      mov      ax, word ptr scanner2_sem
      mov      word ptr sc_curnt_sem, ax
25     mov      ax, word ptr scanner1_sem
      mov      word ptr sc_other_sem, ax
      mov      ax, word ptr sc2_rdy_ptr
      mov      word ptr sc_rdy_ptr, ax
      mov      di, word ptr sc2_rdy_ptr
      mov      word ptr [di], 00h
30     mov      di, word ptr scid_pointer
      mov      word ptr [di], 02h
      push     si
      push     di
      push     es
35     push     word ptr root_token
      push     word ptr scan_token
      push     offset sc2tok

L20007:
40     lea      ax, word ptr [bp-02h]
      push     ax
      call     rqcatalogobject
      pop      es
      pop      di
      pop      si
45     push     si
      push     di

50

55

```

```

5      push    es
      push    word ptr root_token
      push    word ptr scid_token
      push    offset scidtok
      lea     ax, word ptr [bp-04h]
      push    ax
      call    rqcatalogobject
      pop     es
10     pop     di
      pop     si
      push    word ptr scanner_id
      call    init_job_communication
      add     sp, 02h
15     call    smarty_active
      or      ax, ax
      je      word ptr L40
      push    00h
      push    00h
      push    02h
20     push    0ah
      push    01h
      push    offset L41
      jmp     word ptr L20009
25     L40:
      push    00h
      push    00h
      push    02h
      push    0ah
      push    01h
30     push    offset L43
      L20009:
      call    loadjob
      add     sp, 0ch
      push    word ptr scanner_id
35     call    put_scanner_id
      add     sp, 02h
      push    01h
      call    init_scanner
      add     sp, 02h
40     leave
      pop     di
      pop     si
      ret
      public unload_smart
45     unload_smart:

```

50

55

```

5          push    si
          push    di
          enter   02h, 00h
          cmp     word ptr scanner_id, 01h
          jne     word ptr L45
          push    si
          push    di
10         push    es
          push    word ptr root_token
          push    offset scltok
          jmp     word ptr L20015
L45:
          push    si
          push    di
          push    es
          push    word ptr root_token
          push    offset sc2tok
L20015:
20         lea     ax, word ptr [bp-02h]
          push    ax
          call    rquncatalogobject
          pop     es
          pop     di
          pop     si
25         push    01h
          call    dts_finish_host
          add     sp, 02h
          mov     di, word ptr sc_rdy_ptr
          mov     word ptr [di], 01h
30         push    si
          push    di
          push    es
          mov     di, word ptr scan_tok
          push    word ptr [di+02h]
35         lea     ax, word ptr [bp-02h]
          push    ax
          call    rqdeletemailbox
          pop     es
          pop     di
          pop     si
40         push    si
          push    di
          push    es
          mov     di, word ptr scan_tok
          push    word ptr [di+04h]
45
50
55

```

```

    lea     ax, word ptr [bp-02h]
    push    ax
5   call    rqdeletemailbox
    pop     es
    pop     di
    pop     si
    push    si
10  push    di
    push    es
    mov     di, word ptr scan_tok
    push    word ptr [di+06h]
    lea     ax, word ptr [bp-02h]
15  push    ax
    call    rqdeletemailbox
    pop     es
    pop     di
    pop     si
    push    si
20  push    di
    push    es
    mov     di, word ptr scan_tok
    push    word ptr [di+08h]
    lea     ax, word ptr [bp-02h]
25  push    ax
    call    rqdeletemailbox
    pop     es
    pop     di
    pop     si
30  push    si
    push    di
    push    es
    mov     di, word ptr scan_tok
    push    word ptr [di+0ah]
35  lea     ax, word ptr [bp-02h]
    push    ax
    call    rqdeletesegment
    pop     es
    pop     di
    pop     si
40  push    si
    push    di
    push    es
    mov     di, word ptr scan_tok
    push    word ptr [di+0ch]
45  lea     ax, word ptr [bp-02h]

```

50

55

```

    push    ax
    call    rqdeletesegment
    pop     es
5    pop     di
    pop     si
    push    si
    push    di
    push    es
10   mov     di, word ptr scan_tok
    push    word ptr [di]
    lea     ax, word ptr [bp-02h]
    push    ax
    call    rqdeletesegment
15   pop     es
    pop     di
    pop     si
    leave
    pop     di
    pop     si
20   ret
    public decode_rec
decode_rec:
    strings
25
L50:
    db      06ch
    db      06fh
    db      061h
30   db      064h
    db      020h
    db      044h
    db      045h
    db      043h
35   db      04fh
    db      044h
    db      045h
    db      020h
    db      06ah
40   db      06fh
    db      062h
    db      0ah
    db      00h
45   code

```

50

55

```

                                strings
L51:
5      db      03ah
      db      073h
      db      064h
      db      03ah
      db      070h
10     db      072h
      db      069h
      db      073h
      db      06dh
      db      061h
15     db      02fh
      db      073h
      db      079h
      db      073h
      db      074h
20     db      065h
      db      06dh
      db      02fh
      db      064h
      db      065h
      db      063h
25     db      06fh
      db      064h
      db      065h
      db      00h

30     code

      push    si
      push    di
      push    bp
35     mov     bp, sp
      cmpb    byte ptr glpar+023h, 00h
      je      word ptr L49
      push    offset L50
      call    printf
40     add     sp, 02h

L49:
      push    offset L51
      call    unix_system

45

50

55

```

```

    add     sp, 02h
    leave
5      pop     di
      pop     si
      ret
      public reset_control
reset_control:
10     push    si
      push    di
      push    bp
      mov     bp, sp
      leave
      pop     di
15     pop     si
      ret
      public stretch_intgrad
stretch_intgrad:
20     push    si
      push    di
      push    bp
      mov     bp, sp
      leave
      pop     di
25     pop     si
      ret
      public set_vip2_or_bip
set_vip2_or_bip:
30     push    si
      push    di
      push    bp
      mov     bp, sp
      leave
      pop     di
35     pop     si
      ret
      public lut_correct_grad
lut_correct_grad:
40     push    si
      push    di
      push    bp
      mov     bp, sp
      leave
      pop     di
45     pop     si
      ret

```

50

55

```
                public update_tan
update_tan:
5             push    si
              push    di
              push    bp
              mov     bp, sp
              leave
10            pop     di
              pop     si
              ret
```

15

APPENXIX C

20

25

30

35

40

45

50

55

EP 0 475 554 A2

-SRV2\$DUA1:[USERS.SMART.KEIDAR_MJK.RGB;3

	R	G	B	[ORIGINAL]
5				
	1	0	0	0
	2	0	0	0
	3	3	3	0
	4	3	0	3
	5	0	3	3
10	6	2	2	2
	7	5	6	7
	8	12	2	2
	9	2	12	2
	10	12	12	2
	11	2	2	12
	12	12	2	12
15	13	2	12	12
	14	12	12	12
	15	17	3	3
	16	3	17	3
	17	3	3	17
	18	16	16	16
	19	27	26	25
20	20	34	3	3
	21	37	6	7
	22	51	3	3
	23	48	16	16
	24	59	26	25
	25	3	34	3
	26	5	38	7
25	27	3	51	3
	28	16	48	16
	29	27	58	25
	30	3	3	34
	31	5	6	39
	32	3	3	51
	33	16	16	48
30	34	27	26	57
	35	5	5	5
	36	5	5	5
	37	3	3	68
	38	5	6	71
	39	3	3	85
	40	16	16	80
35	41	27	26	89
	42	5	38	39
	43	16	48	48
	44	27	58	57
	45	3	68	3
	46	5	70	7
	47	3	85	3
40	48	16	80	16
	49	27	90	25
	50	37	38	7
	51	48	48	16
	52	59	58	25
	53	37	6	39
	54	48	16	48
45	55	59	26	57
	56	68	3	3
50				
55				

EP 0 475 554 A2

	57	69	6	7
	_SRV2\$DUA1:[USERS.SMART.KEIDAR_MJK.RGBf3			
5	58	85	3	3
	59	80	16	16
	60	91	26	25
	61	102	3	3
	62	101	6	7
	63	119	3	3
10	64	112	16	16
	65	123	26	25
	66	69	38	7
	67	80	48	16
	68	91	58	25
	69	10	10	10
	70	10	10	10
15	71	69	6	39
	72	80	16	48
	73	91	26	57
	74	37	6	71
	75	48	16	80
	76	59	26	89
	77	37	38	39
20	78	59	58	57
	79	37	70	7
	80	48	80	16
	81	59	90	25
	82	3	102	3
	83	5	102	7
	84	3	119	3
25	85	16	112	16
	86	27	122	25
	87	5	70	39
	88	16	80	48
	89	27	90	57
	90	5	38	71
	91	16	48	80
30	92	27	58	89
	93	3	3	102
	94	5	6	103
	95	3	3	119
	96	16	16	112
	97	27	26	121
	98	5	6	135
35	99	3	3	136
	100	3	3	153
	101	16	16	144
	102	27	26	153
	103	16	16	16
	104	16	16	16
	105	5	38	103
40	106	16	48	112
	107	27	58	121
	108	5	70	71
	109	16	80	80
	110	27	90	89
	111	5	102	39
	112	16	112	48
45	113	27	122	57
	114	5	134	7
	115	3	136	3
	116	3	153	3
	117	16	144	16
50	118	27	154	25

EP 0 475 554 A2

	119	37	102	7
	-SRV2\$DUA1:USERS.SMART.KEIDAR.MJK.RGB:3			
5	120	48	112	16
	121	59	122	25
	122	37	70	39
	123	59	90	57
	124	37	38	71
	125	59	58	89
10	126	37	6	103
	127	48	16	112
	128	59	26	121
	129	69	6	71
	130	80	16	80
	131	91	26	89
	132	69	38	39
15	133	91	58	57
	134	69	70	7
	135	80	80	16
	136	91	90	25
	137	21	21	21
	138	21	21	21
	139	101	38	7
20	140	112	48	16
	141	123	58	25
	142	101	6	39
	143	112	16	48
	144	123	26	57
	145	133	6	7
	146	136	3	3
	147	153	3	3
25	148	144	16	16
	149	155	26	25
	150	165	6	7
	151	170	3	3
	152	187	3	3
	153	176	16	16
	154	187	26	25
30	155	133	38	7
	156	144	48	16
	157	155	58	25
	158	133	6	39
	159	144	16	48
	160	155	26	57
	161	101	6	71
35	162	112	16	80
	163	123	26	89
	164	101	38	39
	165	123	58	57
	166	101	70	7
	167	112	80	16
	168	120	91	24
	169	69	102	7
40	170	80	112	16
	171	26	26	26
	172	26	26	26
	173	91	122	25
	174	69	70	39
	175	91	90	57
	176	69	38	71
	177	91	58	89
45	178	69	6	103
	179	80	16	112
	180	91	26	121

50

55

EP 0 475 554 A2

	181	37	6	135
	_SRV2*DUAI:[USERS.SMART.KEIDAR_MJK.RGB:3			
5	182	48	16	144
	183	59	26	153
	184	37	38	103
	185	59	58	121
	186	37	70	71
	187	59	90	89
10	188	37	102	39
	189	59	122	57
	190	37	134	7
	191	48	144	16
	192	59	154	25
	193	5	166	7
	194	3	170	3
15	195	3	187	3
	196	16	176	16
	197	27	186	25
	198	5	134	39
	199	16	144	48
	200	27	154	57
20	201	5	102	71
	202	17	113	81
	203	27	122	89
	204	5	70	103
	205	31	31	31
	206	31	31	31
	207	16	80	112
25	208	27	90	121
	209	5	38	135
	210	16	48	144
	211	27	58	153
	212	5	6	167
	213	3	3	170
	214	3	3	187
30	215	16	16	176
	216	27	26	185
	217	5	6	199
	218	3	3	204
	219	3	3	221
	220	16	16	208
	221	27	26	217
35	222	5	38	167
	223	16	48	176
	224	27	58	185
	225	5	70	135
	226	16	80	144
	227	27	90	153
	228	5	102	103
40	229	16	112	112
	230	27	122	121
	231	5	134	71
	232	16	144	80
	233	27	154	89
	234	5	166	39
	235	16	176	48
45	236	26	187	54
	237	5	198	7
	238	3	204	3
	239	36	36	36
	240	36	36	36
	241	3	221	3
50	242	16	208	16

EP 0 475 554 A2

	243	27	218	25
5	-SRV2#DUA1:[USERS.SMART.KEIDAR_MJK.RGB]3			
	244	37	166	7
	245	48	176	16
	246	59	186	25
	247	37	134	39
	248	59	154	57
10	249	37	102	71
	250	59	122	89
	251	37	70	103
	252	59	90	121
	253	37	38	135
	254	59	58	153
	255	37	6	167
15	256	48	16	176
	257	59	26	185
	258	69	6	135
	259	80	16	144
	260	91	26	153
	261	69	38	103
20	262	91	58	121
	263	69	70	71
	264	91	90	89
	265	69	102	39
	266	91	122	57
	267	69	134	7
	268	80	144	16
25	269	91	154	25
	270	102	103	8
	271	112	112	16
	272	123	122	25
	273	42	42	42
	274	42	42	42
	275	101	70	39
30	276	123	90	57
	277	101	38	71
	278	123	58	89
	279	101	6	103
	280	112	16	112
	281	123	26	121
	282	133	6	71
35	283	144	16	80
	284	155	26	89
	285	133	38	39
	286	155	58	57
	287	133	70	7
	288	144	80	16
	289	155	90	25
40	290	165	38	7
	291	176	48	16
	292	187	58	25
	293	165	6	39
	294	176	16	48
	295	187	26	57
	296	197	6	7
45	297	204	3	3
	298	221	3	3
	299	208	16	16
	300	219	26	25
	301	229	6	7
	302	238	3	3
	303	241	2	2
50	304	251	2	2

EP 0 475 554 A2

	305	253	3	0
	_SRV2\$DUAL:USERS.SMART.KEIDAR_MJK.RGB:3			
5	306	253	0	3
	307	47	47	47
	308	47	47	47
	309	254	3	3
	310	241	12	2
	311	251	12	2
	312	241	2	12
10	313	251	2	12
	314	241	12	12
	315	251	12	12
	316	253	17	3
	317	253	3	17
	318	240	16	16
	319	251	26	25
15	320	197	38	7
	321	208	48	16
	322	219	58	25
	323	197	6	39
	324	208	16	48
	325	219	26	57
20	326	165	6	71
	327	176	16	80
	328	187	26	89
	329	165	38	39
	330	187	58	57
	331	165	70	7
	332	176	80	16
25	333	187	90	25
	334	133	102	7
	335	144	112	16
	336	155	122	25
	337	133	70	39
	338	154	87	58
	339	133	38	71
30	340	155	58	89
	341	52	52	52
	342	52	52	52
	343	133	6	103
	344	144	16	112
	345	155	26	121
	346	101	6	135
35	347	112	16	144
	348	123	26	153
	349	101	38	103
	350	123	58	121
	351	101	70	71
	352	123	90	89
	353	101	102	39
40	354	123	122	57
	355	101	134	7
	356	112	144	16
	357	123	154	25
	358	69	166	7
	359	80	176	16
	360	91	186	25
45	361	69	134	39
	362	91	154	57
	363	69	102	71
	364	91	122	89
	365	69	70	103
	366	91	90	121
50				
55				

EP 0 475 554 A2

367 49 38 135

_SRV2\$DUAL: [USERS.SHART.KEIDAR_MJK.RGB;3

5	368	91	58	153
	369	49	6	167
	370	80	16	176
	371	91	26	185
	372	38	7	200
	373	48	16	208
10	374	59	26	217
	375	57	57	57
	376	57	57	57
	377	37	38	167
	378	59	58	185
	379	37	70	135
	380	59	90	153
15	381	37	102	103
	382	59	122	121
	383	37	134	71
	384	59	154	89
	385	37	166	39
	386	59	186	57
20	387	37	198	7
	388	48	208	16
	389	59	218	25
	390	5	230	7
	391	3	238	3
	392	2	241	2
	393	12	241	2
	394	2	251	2
25	395	3	253	0
	396	0	253	3
	397	3	254	3
	398	12	251	2
	399	2	241	12
	400	12	241	12
	401	2	251	12
30	402	12	251	12
	403	17	253	3
	404	3	253	17
	405	16	240	16
	406	26	247	26
	407	5	198	39
35	408	16	208	48
	409	62	62	62
	410	62	62	62
	411	27	218	57
	412	5	166	71
	413	16	176	80
	414	27	186	89
	415	5	134	103
40	416	16	144	112
	417	27	154	121
	418	5	102	135
	419	16	112	144
	420	27	122	153
	421	5	70	167
45	422	16	80	176
	423	27	90	185
	424	5	38	199
	425	16	48	208
	426	27	58	217
	427	5	6	231
50	428	3	3	238

EP 0 475 554 A2

	429	2	2	241
	_SRV2\$DUA1:CUSERS.SHART.KEIDAR_HJK.RGB:3			
5	430	12	2	241
	431	2	12	241
	432	12	12	241
	433	2	2	251
	434	3	0	253
	435	0	3	253
	436	3	3	254
10	437	12	2	251
	438	2	12	251
	439	12	12	251
	440	16	4	253
	441	3	17	253
	442	16	16	240
15	443	68	68	68
	444	68	68	68
	445	27	26	249
	446	5	38	231
	447	3	34	253
	448	3	51	253
	449	16	48	240
20	450	27	58	249
	451	5	70	199
	452	16	80	208
	453	27	90	217
	454	5	102	167
	455	16	112	176
	456	27	122	185
25	457	5	134	135
	458	16	144	144
	459	27	154	153
	460	5	166	103
	461	16	176	112
	462	27	186	121
	463	5	198	71
30	464	16	208	80
	465	27	218	89
	466	5	230	39
	467	3	253	34
	468	3	253	51
	469	16	240	48
	470	27	250	57
35	471	37	230	7
	472	34	253	3
	473	51	253	3
	474	49	241	17
	475	59	250	25
	476	37	198	39
	477	73	73	73
40	478	73	73	73
	479	59	218	57
	480	37	166	71
	481	59	186	89
	482	37	134	103
	483	59	154	121
	484	37	102	135
45	485	59	122	153
	486	37	70	167
	487	59	90	185
	488	37	38	199
	489	59	58	217
	490	37	6	231
50				
55				

EP 0 475 554 A2

491 34 3 253

_SRV2\$DUA1:[USERS.SMART.KEIDAR_MJK.RGB;3

5	492	51	3	253
	493	48	16	240
	494	59	26	249
	495	69	6	199
	496	80	16	208
	497	91	26	217
	498	69	38	167
10	499	91	58	185
	500	69	70	135
	501	91	90	153
	502	69	102	103
	503	91	122	121
	504	69	134	71
15	505	91	154	89
	506	69	166	39
	507	91	186	57
	508	70	199	8
	509	80	208	16
	510	91	218	25
	511	78	78	78
	512	78	78	78
20	513	101	166	7
	514	112	176	16
	515	123	186	25
	516	101	134	39
	517	123	154	57
	518	101	102	71
	519	123	122	89
25	520	101	70	103
	521	123	90	121
	522	101	38	135
	523	123	58	153
	524	101	6	167
	525	112	16	176
30	526	123	26	185
	527	133	6	135
	528	144	16	144
	529	155	26	153
	530	133	38	103
	531	155	58	121
	532	133	70	71
35	533	155	90	89
	534	133	102	39
	535	155	122	57
	536	133	134	7
	537	144	144	16
	538	155	154	25
	539	165	102	7
40	540	176	112	16
	541	187	122	25
	542	166	71	40
	543	187	90	57
	544	165	38	71
	545	83	83	83
	546	83	83	83
45	547	187	58	89
	548	165	6	103
	549	176	16	112
	550	187	26	121
	551	197	6	71
	552	208	16	80

50

55

EP 0 475 554 A2

553 219 26 89

_SRV2*DUA1:USERS.SMART.KEIDAR_MJK.RGB8:3

5	554	197	38	39
	555	219	58	57
	556	197	70	7
	557	208	80	16
	558	219	90	25
	559	229	38	7
	560	253	34	3
10	561	253	51	3
	562	240	48	16
	563	251	58	25
	564	229	6	39
	565	253	3	34
	566	253	3	51
	567	240	16	48
15	568	251	26	57
	569	229	6	71
	570	253	3	68
	571	253	3	85
	572	240	16	80
	573	251	26	89
	574	229	38	39
20	575	240	48	48
	576	250	59	54
	577	229	70	7
	578	253	68	3
	579	88	88	88
	580	88	88	88
	581	253	85	3
25	582	240	80	16
	583	251	90	25
	584	197	102	7
	585	208	112	16
	586	219	122	25
	587	197	70	39
	588	219	90	57
30	589	197	38	71
	590	219	58	89
	591	197	6	103
	592	208	16	112
	593	219	26	121
	594	165	6	135
	595	176	16	144
35	596	187	26	153
	597	165	38	103
	598	187	58	121
	599	165	70	71
	600	187	90	89
	601	165	102	39
40	602	187	122	57
	603	165	134	7
	604	176	144	16
	605	187	154	25
	606	133	166	7
	607	144	176	16
	608	155	186	25
45	609	133	134	39
	610	154	151	58
	611	133	102	71
	612	155	122	89
	613	94	94	94
	614	94	94	94
50				
55				

EP 0 475 554 A2

	615	133	70	103
_SRV2\$DUA1:[USERS.SMART.KEIDAR_MJK.RGB:3				
5	616	155	90	121
	617	133	38	135
	618	155	58	153
	619	133	6	167
	620	144	16	176
	621	155	26	185
10	622	101	6	199
	623	112	16	208
	624	123	26	217
	625	101	38	167
	626	123	58	185
	627	101	70	135
	628	123	90	153
15	629	101	102	103
	630	123	122	121
	631	101	134	71
	632	123	154	89
	633	101	166	39
	634	123	186	57
	635	101	198	7
20	636	112	208	16
	637	123	218	25
	638	69	230	7
	639	68	253	3
	640	85	253	3
	641	80	240	16
	642	91	250	25
25	643	69	198	39
	644	90	215	58
	645	69	166	71
	646	91	186	89
	647	99	99	99
	648	99	99	99
30	649	69	134	103
	650	91	154	121
	651	69	102	135
	652	91	122	153
	653	69	70	167
	654	91	90	185
	655	69	38	199
	656	91	58	217
35	657	69	6	231
	658	68	3	253
	659	85	3	253
	660	80	16	240
	661	91	26	249
	662	37	38	231
	663	48	48	240
40	664	59	58	249
	665	37	70	199
	666	59	90	217
	667	37	102	167
	668	59	122	185
	669	37	134	135
45	670	59	154	153
	671	37	166	103
	672	59	186	121
	673	37	198	71
	674	59	218	89
	675	37	230	39
	676	48	240	48

50

55

EP 0 475 554 A2

677 59 250 57

_SRV2#DUA1:[USERS.SMART.KEIDAR.MJK.RGB;3

5	678	5	231	71
	679	3	253	68
	680	3	253	85
	681	104	104	104
	682	104	104	104
	683	16	240	80
	684	27	250	89
10	685	5	198	103
	686	16	208	112
	687	27	218	121
	688	5	166	135
	689	16	176	144
	690	27	186	153
15	691	5	134	167
	692	16	144	176
	693	27	154	185
	694	5	102	199
	695	16	112	208
	696	27	122	217
	697	5	70	231
	698	3	68	253
20	699	3	85	253
	700	16	80	240
	701	27	90	249
	702	5	102	231
	703	3	102	253
	704	3	119	253
25	705	16	112	240
	706	27	122	249
	707	5	134	199
	708	16	144	208
	709	27	154	217
	710	5	166	167
	711	16	176	176
30	712	26	187	182
	713	5	198	135
	714	16	208	144
	715	109	109	109
	716	109	109	109
	717	27	218	153
	718	5	230	103
35	719	3	253	102
	720	3	253	119
	721	16	240	112
	722	27	250	121
	723	37	230	71
	724	48	240	80
	725	59	250	89
40	726	37	198	103
	727	59	218	121
	728	37	166	135
	729	59	186	153
	730	37	134	167
	731	59	154	185
	732	37	102	199
45	733	59	122	217
	734	37	70	231
	735	48	80	240
	736	59	90	249
	737	69	38	231
	738	80	48	240

50

55

EP 0 475 554 A2

739 91 58 249

_SRV2\$DUA1:USERS.SMART.KEIDAR.MJK.RGB:

5	740	69	70	199
	741	91	90	217
	742	69	102	167
	743	91	122	185
	744	69	134	135
	745	91	154	153
10	746	70	167	104
	747	91	186	121
	748	69	198	71
	749	114	114	114
	750	114	114	114
	751	91	218	89
	752	69	230	39
15	753	80	240	48
	754	91	250	57
	755	101	230	7
	756	102	253	3
	757	119	253	3
	758	112	240	16
	759	123	250	25
20	760	101	198	39
	761	123	218	57
	762	101	166	71
	763	123	186	89
	764	101	134	103
	765	123	154	121
	766	101	102	135
25	767	123	122	153
	768	101	70	167
	769	123	90	185
	770	101	38	199
	771	123	58	217
	772	101	6	231
	773	102	3	253
30	774	119	3	253
	775	112	16	240
	776	123	26	249
	777	133	6	199
	778	144	16	208
	779	155	26	217
	780	134	39	168
35	781	155	58	185
	782	133	70	135
	783	120	120	120
	784	120	120	120
	785	155	90	153
	786	133	102	103
	787	155	122	121
40	788	133	134	71
	789	155	154	89
	790	133	166	39
	791	155	186	57
	792	133	198	7
	793	144	208	16
	794	155	218	25
45	795	165	166	7
	796	176	176	16
	797	187	186	25
	798	165	134	39
	799	187	154	57
50	800	165	102	71

EP 0 475 554 A2

	801	187	122	89
	_SFV2\$DUA1:USERS.SMART.KEIDAR_MJK.RGB;3.			
5	802	165	70	103
	803	187	90	121
	804	165	38	135
	805	187	58	153
	806	165	6	167
	807	176	16	176
	808	187	26	185
10	809	197	6	135
	810	208	16	144
	811	219	26	153
	812	197	38	103
	813	219	58	121
	814	198	71	72
15	815	219	90	89
	816	197	102	39
	817	125	125	125
	818	125	125	125
	819	219	122	57
	820	197	134	7
	821	208	144	16
20	822	219	154	25
	823	229	102	7
	824	253	102	3
	825	253	119	3
	826	240	112	16
	827	251	122	25
	828	229	70	39
25	829	240	80	48
	830	251	90	57
	831	229	38	71
	832	240	48	80
	833	251	58	89
	834	229	6	103
	835	253	3	102
30	836	253	3	119
	837	240	16	112
	838	251	26	121
	839	229	6	135
	840	253	3	136
	841	253	3	153
	842	240	16	144
35	843	251	26	153
	844	230	39	104
	845	240	48	112
	846	251	58	121
	847	229	70	71
	848	241	81	81
	849	251	90	89
40	850	229	102	39
	851	130	130	130
	852	130	130	130
	853	240	112	48
	854	251	122	57
	855	229	134	7
	856	253	136	3
45	857	253	153	3
	858	240	144	16
	859	251	154	25
	860	197	166	7
	861	208	176	16
	862	219	186	25
50				
55				

EP 0 475 554 A2

	863	197	134	39
5	-SRV2\$DUA1:(USERS.SMART.KEIDAR_MJK.RGR:3			
	864	219	154	57
	865	197	102	71
	866	219	122	89
	867	197	70	103
	868	219	90	121
10	869	197	38	135
	870	219	58	153
	871	197	6	167
	872	208	16	176
	873	219	26	185
	874	165	6	199
	875	176	16	208
15	876	187	26	217
	877	165	38	167
	878	186	59	182
	879	165	70	135
	880	187	90	153
	881	165	102	103
	882	186	123	118
20	883	165	134	71
	884	187	154	89
	885	135	135	135
	886	135	135	135
	887	165	166	39
	888	187	186	57
25	889	165	198	7
	890	176	208	16
	891	187	218	25
	892	133	230	7
	893	136	253	3
	894	153	253	3
	895	144	240	16
30	896	155	250	25
	897	133	198	39
	898	155	218	57
	899	133	166	71
	900	155	186	89
	901	133	134	103
	902	155	154	121
35	903	133	102	135
	904	155	122	153
	905	133	70	167
	906	155	90	185
	907	133	38	199
	908	155	58	217
	909	133	6	231
40	910	136	3	253
	911	153	3	253
	912	145	17	241
	913	155	26	249
	914	101	38	231
	915	112	48	240
	916	122	59	246
45	917	101	70	199
	918	123	90	217
	919	141	141	141
	920	141	141	141
	921	101	102	167
	922	123	122	185
	923	101	134	135
50	924	123	154	153

EP 0 475 554 A2

	925	101	166	103
	_SRV2#DUA1:[USERS.SMART.KEIDAR_MJK.RGB;3			
5	926	123	186	121
	927	101	198	71
	928	123	218	89
	929	101	230	39
	930	112	240	48
	931	123	250	57
10	932	69	230	71
	933	80	240	80
	934	91	250	89
	935	69	198	103
	936	91	218	121
	937	69	166	135
	938	91	186	153
15	939	69	134	167
	940	91	154	185
	941	69	102	199
	942	91	122	217
	943	69	70	231
	944	80	80	240
	945	91	90	249
20	946	38	103	232
	947	48	112	240
	948	59	122	249
	949	40	137	201
	950	58	155	214
	951	37	166	167
	952	59	186	185
25	953	146	146	146
	954	146	146	146
	955	37	198	135
	956	59	218	153
	957	37	230	103
	958	48	240	112
	959	59	250	121
30	960	5	230	135
	961	3	253	136
	962	3	253	153
	963	16	240	144
	964	27	250	153
	965	5	198	167
35	966	16	208	176
	967	27	218	185
	968	5	166	199
	969	16	176	208
	970	27	186	217
	971	5	134	231
	972	3	136	253
40	973	3	153	253
	974	16	144	240
	975	27	154	249
	976	5	166	231
	977	3	170	253
	978	3	187	253
	979	16	176	240
45	980	26	187	246
	981	5	198	199
	982	16	208	208
	983	24	220	211
	984	5	231	167
	985	3	253	170
50	986	3	253	187

EP 0 475 554 A2

987 151 151 151

_SFU2\$DU41:[USERS.SPART.KEIPAR_HJK.RGB;3

5	988	151	151	151
	989	16	240	176
	990	27	250	185
	991	37	230	135
	992	48	240	144
	993	59	250	153
10	994	37	198	167
	995	59	218	185
	996	37	166	199
	997	59	186	217
	998	37	134	231
	999	48	144	240
15	1000	59	154	249
	1001	69	102	231
	1002	80	112	240
	1003	91	122	249
	1004	69	134	199
	1005	91	154	217
	1006	69	166	167
20	1007	91	186	185
	1008	69	198	135
	1009	91	218	153
	1010	69	230	103
	1011	80	240	112
	1012	91	250	121
25	1013	101	230	71
	1014	113	241	81
	1015	123	250	89
	1016	101	198	103
	1017	120	212	123
	1018	102	167	136
	1019	123	186	153
30	1020	101	134	167
	1021	156	156	156
	1022	156	156	156
	1023	123	154	185
	1024	101	102	199
	1025	123	122	217
	1026	101	70	231
35	1027	112	80	240
	1028	123	90	249
	1029	133	38	231
	1030	144	48	240
	1031	155	58	249
	1032	133	70	199
40	1033	155	90	217
	1034	133	102	167
	1035	155	122	185
	1036	133	134	135
	1037	155	154	153
	1038	133	166	103
	1039	155	186	121
45	1040	133	198	71
	1041	155	218	89
	1042	133	230	39
	1043	144	240	48
	1044	155	250	57
	1045	165	230	7
50	1046	170	253	3
	1047	187	253	3
	1048	177	241	17

55

EP 0 475 554 A2

	1049	187	250	25
	_SRV2\$DUA1:[USERS.SMART.KEIDAR_MJK.RGB;3			
5	1050	165	198	39
	1051	184	212	59
	1052	166	167	72
	1053	187	186	89
	1054	165	134	103
	1055	161	161	161
10	1056	161	161	161
	1057	187	154	121
	1058	165	102	135
	1059	187	122	153
	1060	165	70	167
	1061	187	90	185
	1062	165	38	199
15	1063	187	58	217
	1064	165	6	231
	1065	170	3	253
	1066	187	3	253
	1067	176	16	240
	1068	187	26	249
	1069	197	6	199
20	1070	208	16	208
	1071	219	26	217
	1072	197	38	167
	1073	219	58	185
	1074	197	70	135
	1075	219	90	153
	1076	197	102	103
25	1077	219	122	121
	1078	197	134	71
	1079	219	154	89
	1080	197	166	39
	1081	219	186	57
	1082	198	199	8
	1083	208	208	16
30	1084	219	218	25
	1085	232	167	7
	1086	253	171	3
	1087	253	187	3
	1088	214	162	32
	1089	167	167	167
	1090	167	167	167
35	1091	251	186	25
	1092	229	134	39
	1093	240	144	48
	1094	251	154	57
	1095	229	102	71
	1096	240	112	80
	1097	251	122	89
40	1098	229	70	103
	1099	240	80	112
	1100	251	90	121
	1101	229	38	135
	1102	240	48	144
	1103	251	58	153
	1104	229	6	167
45	1105	253	3	170
	1106	253	3	187
	1107	240	16	176
	1108	251	26	185
	1109	229	6	199
	1110	253	3	204
50				
55				

EP 0 475 554 A2

1111 253 3 221

_SRV2\$DUAL:USERS.SMART.KEIDAR.MJK.RGB;3

5	1112	240	16	208
	1113	251	26	217
	1114	229	38	167
	1115	240	48	176
	1116	250	59	182
	1117	229	70	135
10	1118	240	80	144
	1119	248	92	147
	1120	230	103	104
	1121	240	112	112
	1122	223	118	117
	1123	172	172	172
	1124	172	172	172
15	1125	229	134	71
	1126	240	144	80
	1127	251	154	89
	1128	229	166	39
	1129	240	176	48
	1130	251	186	57
	1131	229	198	7
20	1132	253	204	3
	1133	253	221	3
	1134	240	208	16
	1135	251	218	25
	1136	197	230	7
	1137	204	253	3
	1138	221	253	3
25	1139	208	240	16
	1140	219	250	25
	1141	197	198	39
	1142	219	218	57
	1143	197	166	71
	1144	219	186	89
30	1145	197	134	103
	1146	219	154	121
	1147	197	102	135
	1148	219	122	153
	1149	197	70	167
	1150	218	87	186
	1151	197	38	199
35	1152	219	58	217
	1153	198	6	234
	1154	205	3	253
	1155	221	3	253
	1156	188	32	214
	1157	177	177	177
	1158	177	177	177
40	1159	219	26	249
	1160	165	38	231
	1161	176	48	240
	1162	187	58	249
	1163	165	70	199
	1164	187	90	217
	1165	165	102	167
45	1166	187	122	185
	1167	165	134	135
	1168	187	154	153
	1169	165	166	103
	1170	187	186	121
	1171	165	198	71
50	1172	187	218	89

EP 0 475 554 A2

1173 165 230 39

_SRV2*DUAI:(USERS.SMART,KEIDAR_MJK.RGB)3

5	1174	176	240	48
	1175	187	250	57
	1176	133	230	71
	1177	144	240	80
	1178	155	250	89
	1179	133	198	103
	1180	155	218	121
10	1181	133	166	135
	1182	155	186	153
	1183	133	134	167
	1184	154	151	186
	1185	133	102	199
	1186	155	122	217
15	1187	134	71	232
	1188	145	81	241
	1189	155	90	249
	1190	101	102	206
	1191	182	182	182
	1192	182	182	182
	1193	112	112	240
	1194	123	122	249
20	1195	101	134	199
	1196	123	154	217
	1197	101	166	167
	1198	123	186	185
	1199	101	198	135
	1200	123	218	153
25	1201	101	230	103
	1202	112	240	112
	1203	123	250	121
	1204	69	230	135
	1205	80	240	144
	1206	91	250	153
	1207	69	198	167
30	1208	91	218	185
	1209	69	166	199
	1210	91	186	217
	1211	69	134	231
	1212	80	144	240
	1213	91	154	249
35	1214	37	166	231
	1215	48	176	240
	1216	59	186	249
	1217	37	198	199
	1218	58	219	214
	1219	37	230	167
	1220	48	240	176
	1221	52	248	187
40	1222	5	231	199
	1223	3	253	204
	1224	21	224	198
	1225	187	187	187
	1226	187	187	187
	1227	16	240	208
45	1228	27	250	217
	1229	5	198	231
	1230	3	204	253
	1231	3	221	253
	1232	16	208	240
	1233	27	218	249
50	1234	5	230	231

EP 0 475 554 A2

1235 3 238 238

SEV2\$DUA1:USERS.SHART,KEIDAR_MJK.RGB;3

5	1236	3	238	253
	1237	2	241	241
	1238	12	241	241
	1239	2	251	241
	1240	12	251	241
	1241	2	241	251
10	1242	12	241	251
	1243	2	251	251
	1244	0	253	253
	1245	3	254	253
	1246	3	253	254
	1247	12	251	251
	1248	16	240	240
15	1249	17	253	253
	1250	27	250	249
	1251	37	230	199
	1252	49	241	209
	1253	59	250	217
	1254	37	198	231
	1255	49	209	241
20	1256	60	215	248
	1257	69	166	231
	1258	84	162	214
	1259	193	193	193
	1260	193	193	193
	1261	91	186	249
	1262	69	198	199
25	1263	91	218	217
	1264	69	230	167
	1265	80	240	176
	1266	91	250	185
	1267	101	230	135
	1268	112	240	144
	1269	123	250	153
30	1270	101	198	167
	1271	123	218	185
	1272	101	166	199
	1273	123	186	217
	1274	101	134	231
	1275	112	144	240
	1276	123	154	249
35	1277	133	102	231
	1278	144	112	240
	1279	155	122	249
	1280	133	134	199
	1281	155	154	217
	1282	133	166	167
	1283	155	186	185
40	1284	133	198	135
	1285	155	218	153
	1286	134	231	104
	1287	144	240	112
	1288	155	250	121
	1289	166	231	72
45	1290	177	241	81
	1291	187	250	89
	1292	153	180	102
	1293	198	198	198
	1294	198	199	198
	1295	187	218	121
50	1296	165	164	135

EP 0 475 554 A2

	1297	187	186	153
	RAW2\$DUA1:USERS.SMART.KEIDAR.HJK.RGB:3			
5	1298	165	134	167
	1299	187	154	185
	1300	165	102	199
	1301	187	122	217
	1302	165	70	231
	1303	176	80	240
10	1304	187	90	249
	1305	197	38	231
	1306	208	48	240
	1307	219	58	249
	1308	197	70	199
	1309	219	90	217
	1310	197	102	167
15	1311	219	122	185
	1312	197	134	135
	1313	219	154	153
	1314	197	166	103
	1315	219	186	121
	1316	197	198	71
	1317	219	218	89
20	1318	197	230	39
	1319	208	240	48
	1320	220	249	54
	1321	229	230	7
	1322	253	238	3
	1323	238	252	3
	1324	242	241	2
25	1325	251	241	2
	1326	215	223	20
	1327	203	203	203
	1328	203	203	203
	1329	251	251	2
	1330	253	253	0
	1331	254	253	3
30	1332	253	254	3
	1333	241	241	12
	1334	251	241	12
	1335	241	251	12
	1336	251	251	12
	1337	240	240	16
	1338	253	253	17
35	1339	251	250	25
	1340	229	198	39
	1341	240	208	48
	1342	251	218	57
	1343	229	166	71
	1344	240	176	80
40	1345	251	186	89
	1346	229	134	103
	1347	240	144	112
	1348	251	154	121
	1349	229	102	135
	1350	240	112	144
	1351	251	122	153
45	1352	229	70	167
	1353	240	80	176
	1354	250	87	186
	1355	229	38	199
	1356	240	48	208
	1357	248	52	219
50	1358	231	6	231

EP 0 475 554 A2

	1337	253	3	238
5	-SRV2\$DUAL1:[USERS.SMART.KEIDAR_HJK.RGB#3			
	1360	212	21	224
	1361	208	208	208
	1362	208	208	208
	1363	241	2	241
	1364	251	2	241
10	1365	241	12	241
	1366	251	12	241
	1367	241	2	251
	1368	251	2	251
	1369	253	0	253
	1370	254	3	253
	1371	253	3	254
15	1372	241	12	251
	1373	251	12	251
	1374	240	16	240
	1375	253	17	253
	1376	251	26	249
	1377	229	38	231
	1378	253	34	253
20	1379	240	48	240
	1380	253	51	253
	1381	251	58	249
	1382	229	70	199
	1383	240	80	208
	1384	251	90	217
25	1385	229	102	167
	1386	240	112	176
	1387	251	122	185
	1388	230	135	136
	1389	240	144	144
	1390	251	154	153
	1391	230	167	104
	1392	241	177	113
30	1393	251	186	121
	1394	205	190	76
	1395	213	213	213
	1396	213	213	213
	1397	240	208	80
	1398	251	218	89
	1399	229	230	39
35	1400	253	253	34
	1401	240	240	48
	1402	253	253	51
	1403	251	250	57
	1404	197	230	71
	1405	208	240	80
40	1406	219	250	89
	1407	197	198	103
	1408	219	218	121
	1409	197	166	135
	1410	219	186	153
	1411	197	134	167
	1412	219	154	185
45	1413	197	102	199
	1414	219	122	217
	1415	197	70	231
	1416	208	80	240
	1417	219	90	249
	1418	185	102	231
	1419	176	112	240
50	1420	187	122	249

EP 0 475 554 A2

	1421	165	134	199
	_SRV2*DUA1:USERS.SHART.KEIDAR_MJK.RGB;3			
5	1422	186	155	214
	1423	165	166	167
	1424	187	186	185
	1425	168	201	137
	1426	186	219	150
	1427	165	230	103
10	1428	162	214	110
	1429	219	219	219
	1430	219	219	219
	1431	187	250	121
	1432	133	230	135
	1433	144	240	144
	1434	155	250	153
15	1435	133	198	167
	1436	155	218	185
	1437	133	166	199
	1438	155	186	217
	1439	133	134	231
	1440	144	144	240
	1441	155	154	249
20	1442	101	166	231
	1443	112	176	240
	1444	123	186	249
	1445	101	198	199
	1446	123	218	217
	1447	101	230	167
	1448	112	240	176
25	1449	123	250	185
	1450	69	230	199
	1451	50	240	208
	1452	91	250	217
	1453	69	198	231
	1454	80	206	240
30	1455	91	218	249
	1456	37	231	232
	1457	34	253	253
	1458	48	240	240
	1459	52	253	253
	1460	60	249	248
	1461	69	230	231
35	1462	74	124	24
	1463	224	224	224
	1464	224	224	224
	1465	80	240	240
	1466	85	253	253
	1467	91	250	249
	1468	101	230	199
40	1469	112	240	208
	1470	123	250	217
	1471	101	198	231
	1472	112	208	240
	1473	123	218	249
	1474	133	166	231
	1475	144	176	240
45	1476	155	186	249
	1477	133	198	199
	1478	155	218	217
	1479	133	230	167
	1480	144	240	176
	1481	155	250	185
50	1482	165	230	135

EP 0 475 554 A2

_SRV2#DUA1:USERS.SMART.NEIDAR_MJK.RGB:3

	1484	187	250	153
	1485	165	198	167
5	1486	186	215	186
	1487	165	166	199
	1488	187	186	217
	1489	165	134	231
	1490	177	145	241
	1491	187	154	249
	1492	197	102	231
10	1493	209	113	241
	1494	218	123	246
	1495	197	134	199
	1496	197	144	195
	1497	229	229	229
	1498	229	229	229
	1499	197	166	167
15	1500	219	186	185
	1501	197	198	135
	1502	219	218	153
	1503	197	230	103
	1504	208	240	112
	1505	219	250	121
	1506	229	230	71
20	1507	253	253	68
	1508	240	240	80
	1509	253	253	85
	1510	251	250	89
	1511	229	198	103
	1512	240	208	112
	1513	251	218	121
25	1514	229	166	135
	1515	240	176	144
	1516	251	186	153
	1517	229	134	167
	1518	240	144	176
	1519	251	154	185
30	1520	230	103	200
	1521	240	112	208
	1522	251	122	217
	1523	229	70	231
	1524	252	69	252
	1525	240	80	240
	1526	253	85	253
35	1527	248	92	247
	1528	231	102	232
	1529	253	102	253
	1530	214	110	214
	1531	234	234	234
	1532	234	234	234
	1533	253	119	253
40	1534	251	122	249
	1535	229	134	199
	1536	240	144	208
	1537	251	154	217
	1538	229	166	167
	1539	240	176	176
	1540	251	186	185
45	1541	229	198	135
	1542	240	208	144
	1543	251	218	153
	1544	229	230	103

50

55

EP 0 475 554 A2

	1545	253	253	102
	-SRV2\$B0A1:USERS.SMART.NEIDAR.MJK.RGB;3			
5	1546	240	240	112
	1547	253	253	119
	1548	251	250	121
	1549	197	230	135
	1550	208	240	144
	1551	219	238	153
10	1552	197	198	167
	1553	219	218	185
	1554	198	167	200
	1555	219	186	217
	1556	197	134	231
	1557	208	144	240
	1558	216	155	248
15	1559	165	166	231
	1560	176	176	240
	1561	184	188	243
	1562	166	199	200
	1563	187	218	217
	1564	153	206	154
20	1565	239	239	239
	1566	239	239	239
	1567	176	240	176
	1568	187	250	185
	1569	133	230	199
	1570	144	240	208
	1571	155	250	217
25	1572	133	198	231
	1573	144	208	240
	1574	155	218	249
	1575	161	230	231
	1576	162	253	253
	1577	112	240	240
	1578	119	253	253
30	1579	123	250	249
	1580	133	230	231
	1581	136	253	253
	1582	144	240	240
	1583	155	250	249
	1584	153	253	253
	1585	165	230	199
35	1586	176	240	208
	1587	187	250	217
	1588	166	199	232
	1589	176	208	240
	1590	187	218	249
	1591	197	166	231
	1592	209	177	241
40	1593	219	186	249
	1594	197	196	199
	1595	216	220	211
	1596	198	231	168
	1597	208	240	176
	1598	197	222	169
	1599	245	245	245
45	1600	245	245	245
	1601	229	230	135
	1602	253	253	136
	1603	240	240	144
	1604	251	250	153
	1605	253	253	153
50	1606	229	198	167

EP 0 475 554 A2

1607 240 208 176

_SRV2\$DUA1:USERS.SMART.KEIDAR_MJK.RGS;3

5	1608	251	218	185
	1609	229	166	199
	1610	240	176	208
	1611	251	186	217
	1612	229	134	231
	1613	253	136	253
10	1614	240	144	240
	1615	251	154	249
	1616	253	153	253
	1617	229	166	231
	1618	253	170	253
	1619	240	176	240
	1620	251	186	249
15	1621	253	187	253
	1622	230	199	200
	1623	240	208	208
	1624	251	218	217
	1625	232	233	167
	1626	252	252	170
	1627	240	240	176
20	1628	251	250	185
	1629	246	250	189
	1630	198	231	200
	1631	208	240	208
	1632	197	222	195
	1633	250	250	250
	1634	250	250	250
25	1635	197	198	231
	1636	208	208	240
	1637	219	218	249
	1638	165	230	231
	1639	170	253	253
	1640	176	240	240
30	1641	187	250	249
	1642	187	253	253
	1643	197	230	231
	1644	204	253	253
	1645	208	240	240
	1646	219	250	249
	1647	221	253	253
35	1648	229	230	199
	1649	253	253	204
	1650	240	240	208
	1651	251	250	217
	1652	253	253	221
	1653	229	198	231
	1654	253	204	253
40	1655	240	208	240
	1656	251	218	249
	1657	253	221	253
	1658	229	230	231
	1659	253	251	240
	1660	252	239	253
	1661	238	253	253
45	1662	240	240	240
	1663	242	241	241
	1664	250	242	241
	1665	241	251	241
	1666	223	223	215
	1667	254	254	254
	1668	254	254	254
50	1669	241	241	251

_SRV2#DUA1:[USERS.SMART.KEIDAR.MJK.RGB#3

1670	251	241	251
1671	241	251	251
1672	251	250	249
1673	251	251	251
1674	254	253	253
1675	253	254	253
1676	253	253	254

APPENDIX D

_SRV2#DUA1:[USERS.SMART.KEIDAR.MJDB.RGB#3

	R	G	B	[4 C A S T]
1	75	66	53	
2	74	65	50	
3	77	66	51	
4	76	65	53	
5	74	67	54	
6	75	66	53	
7	82	72	59	
8	83	64	52	
9	77	74	53	
10	86	73	54	
11	74	65	52	
12	86	68	57	
13	75	71	53	
14	85	71	55	
15	87	63	50	
16	80	80	57	
17	78	66	57	
18	86	72	57	
19	90	73	56	
20	95	56	45	
21	96	53	42	
22	108	46	38	
23	104	59	45	
24	112	63	49	
25	79	91	55	
26	81	94	55	
27	80	105	54	
28	87	96	55	
29	89	95	54	
30	74	56	56	
31	73	55	58	
32	68	48	58	
33	80	59	63	
34	85	62	64	
35	78	66	52	

EP 0 475 554 A2

	36	79	68	54
	37	59	40	57
	38	58	39	57
	39	52	31	56
5	40	67	44	63
	41	76	51	71
	42	70	82	60
	43	77	87	65
	44	81	88	66
	45	76	115	53
	46	78	116	54
10	47	74	124	51
	48	83	118	56
	49	87	121	58
	50	96	76	42
	51	103	79	42
	52	111	86	50
	53	95	52	55
15	54	103	56	59
	55	112	60	64
	56	121	45	40
	57	121	48	39

-SRV2#DUA1:[USERS.SMART.KEIDAR.MJDB.RGB]3

20	58	134	41	38
	59	129	48	40
	60	140	53	45
	61	151	30	35
	62	150	31	35
25	63	163	31	38
	64	157	43	43
	65	165	54	52
	66	120	66	37
	67	127	74	42
	68	138	82	49
	69	84	71	56
30	70	84	72	57
	71	119	40	48
	72	127	46	53
	73	138	54	60
	74	92	44	63
	75	100	50	68
	76	108	54	76
35	77	93	73	55
	78	109	83	63
	79	95	98	42
	80	103	103	46
	81	110	109	48
	82	69	132	46
	83	70	132	49
40	84	66	137	45
	85	76	133	53
	86	80	137	55
	87	69	104	63
	88	74	106	67
	89	81	114	74
	90	61	64	62
45	91	69	71	68
	92	78	79	78
	93	55	32	71
	94	57	33	73
	95	57	34	80
	96	71	46	87
50	97	80	57	94

EP 0 475 554 A2

	98	61	38	96
	99	62	40	96
	100	63	44	108
	101	70	47	104
5	102	76	49	107
	103	87	71	55
	104	87	72	55
	105	58	63	80
	106	67	72	89
	107	74	78	97
	108	56	87	63
10	109	69	100	76
	110	77	111	90
	111	67	129	65
	112	71	131	69
	113	79	139	77
	114	65	145	47
	115	63	146	43
15	116	60	156	41
	117	72	152	50
	118	80	163	60
	119	93	120	41

-SRV2\$DUA1:[USERS.SMART.KEIDAR_MJDB.RGB#3

20	120	101	125	46
	121	110	133	53
	122	94	97	59
	123	111	110	69
	124	91	66	66
	125	108	78	79
25	126	89	37	77
	127	98	44	85
	128	106	47	91
	129	118	42	66
	130	126	46	70
	131	138	55	82
	132	119	68	54
30	133	138	82	65
	134	120	93	43
	135	127	97	43
	136	138	108	51
	137	89	70	53
	138	89	70	53
	139	150	67	43
35	140	158	77	49
	141	168	86	55
	142	149	34	50
	143	158	47	59
	144	166	58	68
	145	176	39	43
	146	179	35	40
40	147	191	35	41
	148	186	51	50
	149	192	59	56
	150	199	35	41
	151	202	37	46
	152	211	38	48
	153	205	51	50
45	154	211	59	52
	155	177	68	45
	156	188	77	54
	157	194	88	60
	158	174	41	58
	159	182	51	63

50

55

EP 0 475 554 A2

	160	190		
	161	147	61	70
	162	155	41	68
	163	163	49	74
5	164	149	57	83
	165	166	69	59
	166	151	88	75
	167	159	93	49
	168	165	99	51
	169	118	112	56
10	170	125	118	40
	171	89	124	45
	172	89	70	53
	173	138	71	53
	174	118	137	56
	175	139	93	56
	176	115	110	70
15	177	138	63	64
	178	114	82	83
	179	124	37	82
	180	136	46	89
	181	88	52	95
			38	98

20	-SRV2#DUA1:USERS.SHART.KEIDAR.MIDB.RGB:3			
	182	99	47	105
	183	106	50	112
	184	88	60	82
	185	108	78	101
25	186	92	93	76
	187	110	108	89
	188	93	126	66
	189	109	135	75
	190	89	141	41
	191	101	152	50
	192	109	159	58
30	193	61	165	47
	194	64	170	50
	195	61	181	50
	196	70	176	57
	197	78	181	60
	198	63	150	66
	199	71	160	77
35	200	77	167	83
	201	62	124	77
	202	68	132	85
	203	74	138	94
	204	60	91	85
	205	91	72	54
	206	91	71	53
40	207	67	98	98
	208	73	106	105
	209	58	67	101
	210	67	72	109
	211	74	80	119
	212	62	47	116
	213	60	45	120
45	214	58	41	126
	215	70	51	125
	216	77	54	131
	217	60	43	135
	218	56	38	137
	219	58	42	148
50	220	69	51	143
	221	76	56	150

EP 0 475 554 A2

	222	58	56	123
	223	68	76	132
	224	77	84	137
	225	62	93	112
5	226	72	101	122
	227	78	110	131
	228	63	124	105
	229	69	129	111
	230	73	135	118
	231	60	150	85
	232	67	161	97
10	233	75	168	110
	234	63	175	69
	235	69	180	77
	236	72	184	82
	237	62	187	49
	238	59	190	45
	239	94	72	55
15	240	94	72	52
	241	57	204	49
	242	68	195	57
	243	75	201	64

_SRV2#DUA1:[USERS.SMART.KEIDAR_MJDB.RGB:3

20	244	89	165	44
	245	99	171	53
	246	109	178	63
	247	92	153	71
	248	108	162	82
	249	89	123	81
25	250	108	135	100
	251	89	88	92
	252	108	105	109
	253	89	60	104
	254	107	77	122
	255	90	38	120
	256	98	42	127
30	257	106	47	132
	258	115	35	101
	259	124	45	109
	260	134	52	114
	261	117	62	88
	262	137	85	105
	263	118	88	69
35	264	140	107	89
	265	119	120	60
	266	141	134	77
	267	120	145	48
	268	128	152	55
	269	136	159	60
	270	151	122	49
40	271	158	130	55
	272	166	137	62
	273	98	71	53
	274	99	72	53
	275	153	94	61
	276	168	116	75
	277	151	68	70
45	278	165	87	87
	279	147	35	85
	280	155	46	72
	281	164	57	99
	282	176	39	70
	283	184	48	77

50

55

EP 0 475 554 A2

	284	191	57	86
	285	177	70	73
	286	194	91	76
	287	187	92	52
5	288	190	103	60
	289	195	121	62
	290	200	70	46
	291	205	83	50
	292	211	93	57
	293	199	37	58
	294	205	48	64
10	295	210	59	71
	296	219	39	46
	297	224	31	41
	298	235	28	41
	299	226	49	50
	300	233	56	56
	301	239	34	48
15	302	247	31	46
	303	249	27	45
	304	254	30	45
	305	254	36	46
-SRV2\$DUA1:[USERS.SHART.KEIDAR_MJDB.RGB#3				
20	306	254	29	48
	307	103	76	58
	308	104	75	57
	309	254	28	43
	310	250	45	50
	311	254	40	40
25	312	250	20	46
	313	254	23	44
	314	251	40	49
	315	254	42	47
	316	254	49	43
	317	254	30	49
	318	251	45	53
30	319	254	60	60
	320	220	76	49
	321	227	84	55
	322	233	96	61
	323	220	39	61
	324	227	50	70
35	325	234	56	75
	326	199	37	72
	327	205	50	78
	328	211	59	88
	329	198	71	64
	330	210	94	76
	331	199	98	47
40	332	203	111	54
	333	210	126	61
	334	177	124	50
	335	186	132	55
	336	191	142	60
	337	177	95	65
	338	190	121	82
45	339	173	74	78
	340	187	94	92
	341	105	79	61
	342	106	80	61
	343	172	36	90
	344	181	46	96
50	345	188	57	102

EP 0 475 554 A2

	346	142	33	103
	347	151	44	109
	348	161	53	116
	349	148	66	89
	350	163	86	105
5	351	151	95	76
	352	165	116	96
	353	152	125	64
	354	167	141	81
	355	151	145	51
	356	157	153	56
	357	165	161	62
10	358	118	164	47
	359	126	172	54
	360	137	178	61
	361	119	147	63
	362	137	159	81
	363	117	120	78
	364	138	137	100
15	365	115	86	91
	366	135	110	111
	367	114	59	105

_SRV2#DUA1:[USERS.SMART.KEIDAR_MJDB.RGB]3

20	368	133	83	124
	369	114	33	120
	370	122	43	126
	371	133	57	133
	372	89	44	138
	373	97	52	144
	374	103	55	151
25	375	108	83	63
	376	108	82	64
	377	85	61	124
	378	104	79	139
	379	84	85	111
	380	105	107	131
	381	85	121	104
30	382	104	132	120
	383	86	152	88
	384	103	164	107
	385	88	174	71
	386	105	182	85
	387	88	187	48
	388	98	193	56
35	389	107	201	62
	390	59	210	54
	391	57	214	51
	392	56	216	49
	393	65	213	50
	394	56	221	49
	395	58	222	48
40	396	55	221	51
	397	57	221	52
	398	65	218	50
	399	55	217	58
	400	64	215	58
	401	57	222	60
	402	65	222	61
45	403	69	221	52
	404	57	224	66
	405	69	215	64
	406	72	218	67
	407	61	184	75

50

55

EP 0 475 554 A2

	408	65	199	83
	409	112	86	68
	410	111	86	67
5	411	69	208	90
	412	56	180	95
	413	63	184	101
	414	69	187	113
	415	56	150	110
	416	63	158	121
	417	71	164	126
10	418	56	124	124
	419	66	130	132
	420	74	136	139
	421	58	95	132
	422	67	101	140
	423	75	110	149
	424	57	69	142
15	425	67	78	150
	426	75	85	157
	427	58	41	153
	428	56	39	154
	429	54	39	155
-SRV2%DUA1:[USERS.SMART.KEIDAR.MJDB.RGB;3				
20	430	64	38	154
	431	54	46	156
	432	62	45	157
	433	54	39	160
25	434	54	38	162
	435	54	40	164
	436	57	41	166
	437	63	40	164
	438	55	49	166
	439	64	48	164
	440	66	41	162
30	441	58	54	164
	442	66	49	156
	443	117	90	72
	444	116	90	70
	445	75	55	163
	446	57	71	158
	447	57	70	166
35	448	55	84	171
	449	67	80	163
	450	75	87	171
	451	57	96	149
	452	67	103	157
	453	75	112	167
	454	57	125	141
40	455	66	131	149
	456	74	139	158
	457	57	148	131
	458	65	157	140
	459	73	164	148
	460	55	175	119
	461	64	181	127
45	462	71	187	133
	463	55	197	99
	464	61	201	106
	465	68	208	117
	466	56	212	79
	467	55	224	76
	468	51	229	90
50	469	63	219	86

EP 0 475 554 A2

	470	70	224	93
	471	87	206	52
	472	83	218	52
	473	99	216	53
5	474	97	211	59
	475	104	218	64
	476	85	190	72
	477	122	97	76
	478	122	94	73
	479	105	205	67
	480	85	176	94
10	481	100	184	111
	482	85	150	114
	483	102	160	129
	484	87	117	123
	485	107	131	143
	486	88	87	132
	487	107	107	152
15	488	89	64	143
	489	107	80	160
	490	88	37	156
	491	85	34	165

_SRV2#DUA1:USERS.SMART.KEIDAR_MJDB.RGR#3

20	492	100	32	165
	493	98	45	162
	494	107	51	163
	495	115	32	137
	496	122	42	143
	497	134	52	151
25	498	114	60	125
	499	133	84	141
	500	115	86	113
	501	135	111	132
	502	116	117	101
	503	136	136	118
30	504	120	144	86
	505	135	163	102
	506	119	166	66
	507	136	181	85
	508	117	185	51
	509	123	192	58
	510	133	199	64
35	511	126	99	78
	512	127	98	78
	513	147	167	52
	514	155	175	60
	515	163	183	67
	516	150	149	67
	517	164	164	85
	518	152	123	83
40	519	163	143	102
	520	150	93	97
	521	162	117	116
	522	148	66	108
	523	163	87	126
	524	148	34	119
	525	157	45	124
45	526	164	55	134
	527	172	36	107
	528	181	47	115
	529	189	58	121
	530	173	71	96
	531	187	92	110

50

55

EP 0 475 554 A2

	532	174	99	82
	533	184	124	101
	534	179	130	70
	535	192	147	83
5	536	174	149	51
	537	184	159	57
	538	192	168	44
	539	199	134	56
	540	205	141	58
	541	211	149	64
10	542	200	105	69
	543	210	129	83
	544	197	74	80
	545	133	101	82
	546	134	101	81
	547	212	96	98
	548	197	36	91
	549	204	49	99
15	550	211	59	106
	551	220	37	75
	552	227	48	85
	553	235	59	93

_SRV2\$DUA1:USERS.SMART.KEIDAR.MJDR.RGR#3

20	554	220	75	65
	555	233	99	81
	556	221	108	51
	557	226	116	56
	558	233	127	59
	559	242	72	51
25	560	254	70	47
	561	254	91	49
	562	249	87	59
	563	254	101	63
	564	242	33	66
	565	254	32	61
30	566	254	33	71
	567	250	48	75
	568	254	60	77
	569	242	35	80
	570	254	34	79
	571	254	37	88
	572	250	51	88
35	573	254	64	91
	574	240	76	67
	575	247	91	75
	576	254	106	79
	577	237	108	52
	578	253	108	54
	579	139	108	91
40	580	140	108	90
	581	254	124	53
	582	247	119	59
	583	254	133	63
	584	218	137	54
	585	225	145	58
	586	231	156	62
45	587	219	108	70
	588	232	132	84
	589	220	75	82
	590	233	99	102
	591	219	39	97
	592	227	50	103
50	593	233	59	110

EP 0 475 554 A2

	594	197	36	110
	595	204	51	120
	596	210	61	127
	597	197	74	100
	598	210	95	116
5	599	199	103	85
	600	211	129	104
	601	199	134	71
	602	211	152	85
	603	198	156	54
	604	204	165	60
	605	211	176	65
10	606	174	171	53
	607	182	180	60
	608	190	189	65
	609	175	153	73
	610	189	170	87
	611	173	133	88
	612	187	147	107
15	613	143	117	99
	614	143	115	98
	615	172	101	103

SRV2*DUA1:USERS.SMART,KEIDAR_MJDB.RGB:3

20	616	186	122	119
	617	170	69	111
	618	188	93	129
	619	170	34	121
	620	180	46	130
	621	188	56	137
25	622	147	34	134
	623	154	45	143
	624	162	54	152
	625	145	67	127
	626	161	86	144
	627	146	94	119
	628	159	116	137
30	629	147	126	109
	630	159	142	123
	631	148	149	92
	632	158	168	109
	633	148	170	75
	634	162	185	93
	635	145	185	55
35	636	154	194	63
	637	161	204	68
	638	115	205	56
	639	114	218	54
	640	127	220	54
	641	123	213	63
	642	132	221	68
40	643	116	189	74
	644	132	203	94
	645	114	171	95
	646	126	191	113
	647	145	121	103
	648	144	122	103
	649	114	145	115
45	650	127	166	129
	651	114	115	127
	652	133	133	145
	653	113	89	135
	654	134	110	156
	655	113	65	140

50

55

EP 0 475 554 A2

	656	134	84	163
	657	113	33	154
	658	113	29	164
	659	128	29	164
5	660	123	43	161
	661	135	51	169
	662	89	66	161
	663	100	76	167
	664	107	81	176
	665	91	92	152
	666	107	108	171
10	667	88	121	145
	668	107	132	163
	669	86	144	133
	670	102	157	155
	671	84	172	122
	672	99	184	139
	673	83	193	102
15	674	100	208	121
	675	86	212	79
	676	95	218	87
	677	103	225	93

-SRV2\$DUA1:USERS.SMART.KEIDAR_M1DB.RGB13

20	678	55	221	105
	679	51	232	106
	680	51	232	122
	681	148	130	109
	682	147	132	110
	683	61	224	116
25	684	67	233	126
	685	53	199	128
	686	61	205	134
	687	67	213	144
	688	54	176	141
	689	63	183	152
	690	70	190	161
30	691	58	154	152
	692	66	162	161
	693	70	168	171
	694	60	130	160
	695	68	136	170
	696	74	140	181
	697	62	99	167
35	698	60	99	179
	699	60	113	185
	700	71	103	175
	701	77	113	188
	702	59	130	180
	703	56	131	192
	704	54	143	201
40	705	66	136	190
	706	73	141	199
	707	59	157	172
	708	66	165	184
	709	71	171	192
	710	57	178	161
	711	62	186	170
45	712	64	194	177
	713	55	200	148
	714	61	208	159
	715	151	136	112
	716	150	136	113

50

55

EP 0 475 554 A2

	717	65	218	158
	718	51	222	134
	719	48	236	138
	720	46	237	148
	721	59	228	142
5	722	66	233	148
	723	83	216	102
	724	93	222	110
	725	100	228	122
	726	82	196	128
	727	97	209	145
	728	85	173	143
10	729	99	183	161
	730	88	148	155
	731	102	164	170
	732	90	122	164
	733	108	134	180
	734	91	93	169
	735	101	99	178
15	736	108	106	188
	737	115	63	161
	738	123	74	170
	739	135	80	180

_SRV2*DUAI:USERS.SMART.KEIDAR_MJDB.RGB:3

20	740	115	89	156
	741	135	111	174
	742	117	117	149
	743	136	133	163
	744	114	142	138
	745	131	158	154
25	746	111	170	122
	747	125	187	132
	748	112	191	101
	749	153	140	116
	750	154	140	116
	751	132	210	118
30	752	114	210	76
	753	121	218	86
	754	131	225	94
	755	144	209	54
	756	144	220	50
	757	157	221	52
	758	153	215	60
	759	161	223	65
35	760	145	193	77
	761	161	209	93
	762	146	171	94
	763	159	189	115
	764	144	155	113
	765	158	169	128
	766	147	124	128
40	767	161	142	145
	768	144	97	138
	769	161	114	156
	770	145	68	145
	771	160	84	164
	772	147	34	152
	773	147	29	161
45	774	159	31	163
	775	154	45	160
	776	163	55	169
	777	172	37	160
	778	180	49	168
	779	188	57	154

50

55

EP 0 475 554 A2

	780	172	71	129
	781	187	92	143
	782	169	101	120
	783	157	144	122
5	784	157	146	123
	785	188	123	138
	786	171	133	112
	787	188	147	124
	788	173	157	94
	789	191	172	110
	790	175	175	75
10	791	194	193	89
	792	172	191	54
	793	183	201	59
	794	193	209	66
	795	198	179	52
	796	205	189	59
	797	212	198	66
15	798	199	160	73
	799	212	181	87
	800	198	137	90
	801	211	156	109

-SRV2*DUA1:USERS.SMART,KEIDAR_MJDB.RGB13

20	802	198	106	106
	803	211	130	122
	804	197	74	118
	805	209	96	135
	806	196	38	126
	807	203	50	134
25	808	209	59	142
	809	219	39	114
	810	225	51	121
	811	232	59	129
	812	219	78	105
	813	232	99	119
	814	219	111	90
30	815	230	133	109
	816	216	142	78
	817	161	147	128
	818	161	147	128
	819	232	160	89
	820	219	164	57
	821	226	175	60
35	822	234	187	63
	823	239	144	49
	824	254	146	49
	825	254	160	50
	826	248	156	57
	827	254	165	64
	828	240	114	70
40	829	248	126	78
	830	254	139	82
	831	242	79	85
	832	250	96	93
	833	254	111	99
	834	243	37	98
	835	254	36	95
45	836	254	36	102
	837	251	55	107
	838	254	65	105
	839	241	37	111
	840	254	35	110
50	841	254	34	119

EP 0 475 554 A2

	842	248	50	121
	843	254	65	126
	844	240	77	105
	845	248	94	111
5	846	254	107	116
	847	239	114	70
	848	247	127	100
	849	254	138	107
	850	235	145	74
	851	166	150	134
	852	167	152	134
10	853	247	159	86
	854	254	168	94
	855	238	172	51
	856	254	178	54
	857	254	190	55
	858	246	183	61
	859	254	194	69
15	860	220	189	56
	861	228	199	61
	862	234	204	66
	863	220	168	75

_SRV2\$DUA1:IUSERS.SMART.KEIDAR_MJDB.RGB:3

20	864	234	198	90
	865	219	142	93
	866	232	161	113
	867	220	110	112
	868	232	135	128
	869	219	77	123
25	870	233	98	142
	871	219	41	130
	872	225	50	138
	873	231	55	146
	874	195	36	142
	875	202	46	150
	876	208	56	159
30	877	196	72	134
	878	209	96	150
	879	197	105	125
	880	209	130	141
	881	196	136	114
	882	208	156	125
35	883	197	162	96
	884	208	181	113
	885	172	157	142
	886	172	156	140
	887	199	181	80
	888	210	200	93
	889	196	199	52
	890	204	208	61
40	891	210	216	68
	892	173	212	55
	893	174	223	53
	894	189	225	50
	895	183	219	61
	896	191	226	68
45	897	174	198	78
	898	191	212	95
	899	174	178	97
	900	189	191	115
	901	170	156	117
	902	189	171	131
	903	169	128	132

50

55

EP 0 475 554 A2

	904	184	144	146
	905	171	99	138
	906	187	121	156
	907	169	69	146
5	908	186	86	163
	909	169	34	152
	910	171	31	161
	911	182	32	166
	912	177	47	162
	913	185	56	170
	914	144	67	165
10	915	152	76	170
	916	158	85	178
	917	143	99	158
	918	159	115	172
	919	176	161	144
	920	176	162	144
	921	146	123	151
15	922	159	143	163
	923	139	152	136
	924	156	171	152
	925	139	180	119

-SRV2#DUA1:USERS.SMART.KEIDAR_MJDB.RGB#3

20	926	155	194	136
	927	143	195	99
	928	156	213	121
	929	144	213	79
	930	151	220	87
	931	158	227	97
25	932	114	214	100
	933	121	222	111
	934	130	229	122
	935	107	195	131
	936	129	213	142
	937	111	167	148
30	938	127	188	159
	939	115	140	159
	940	133	164	168
	941	115	118	167
	942	133	138	179
	943	115	90	172
	944	123	97	180
35	945	133	111	188
	946	89	123	185
	947	98	130	191
	948	105	138	198
	949	87	152	175
	950	101	168	187
	951	82	176	163
40	952	96	191	178
	953	180	166	149
	954	180	167	150
	955	80	200	154
	956	94	216	168
	957	79	220	134
	958	89	226	141
45	959	96	233	150
	960	51	226	159
	961	47	242	164
	962	46	246	176
	963	58	232	166
	964	64	241	173
50	965	52	206	175

EP 0 475 554 A2

	966	51	214	182
	967	52	224	191
	968	52	184	186
	969	60	190	197
5	970	46	197	207
	971	58	158	195
	972	54	159	211
	973	52	172	221
	974	64	164	206
	975	70	170	218
	976	52	183	210
10	977	48	186	232
	978	46	201	242
	979	61	193	216
	980	65	197	237
	981	50	213	198
	982	56	222	212
	983	60	229	224
15	984	48	234	181
	985	45	250	186
	986	42	254	198
	987	184	172	153

_SRV2#DUA1: IUSERS. SHART. KEIDAR. M3DB. RGB13

20	988	184	173	154
	989	56	241	190
	990	62	251	198
	991	76	222	158
	992	86	230	165
	993	94	236	170
25	994	78	201	173
	995	93	219	187
	996	81	177	185
	997	95	191	203
	998	86	151	195
	999	94	158	204
30	1000	100	166	215
	1001	117	119	182
	1002	124	130	189
	1003	133	140	198
	1004	117	148	173
	1005	131	169	189
	1006	112	168	165
35	1007	126	192	176
	1008	107	194	155
	1009	123	216	165
	1010	109	218	134
	1011	117	226	140
	1012	128	233	145
	1013	142	216	104
40	1014	147	223	114
	1015	155	230	124
	1016	140	199	127
	1017	155	215	143
	1018	140	179	145
	1019	153	195	157
	1020	142	148	157
45	1021	188	174	156
	1022	188	175	157
	1023	157	173	172
	1024	146	123	168
	1025	158	144	181
	1026	146	92	174
50	1027	158	88	181

EP 0 475 554 A2

	1028	160	114	189
	1029	170	77	163
	1030	179	76	171
	1031	186	84	179
5	1032	170	95	158
	1033	188	117	174
	1034	170	128	151
	1035	187	145	164
	1036	169	154	140
	1037	188	173	153
	1038	172	175	122
10	1039	182	191	139
	1040	174	198	102
	1041	188	210	121
	1042	174	213	80
	1043	182	219	92
	1044	189	226	100
	1045	197	214	57
15	1046	199	227	53
	1047	210	231	52
	1048	202	224	62
	1049	209	231	69
-SRV2\$DUAL1:USERS.SHART.KEIDAR_MJDB.RGB#3				
20	1050	198	202	78
	1051	209	215	95
	1052	199	185	100
	1053	208	197	115
	1054	196	160	117
25	1055	190	178	160
	1056	191	177	159
	1057	210	182	131
	1058	196	136	131
	1059	210	157	144
	1060	196	106	140
	1061	209	131	156
	1062	196	71	149
30	1063	210	97	166
	1064	195	34	157
	1065	197	29	166
	1066	210	29	166
	1067	201	46	164
	1068	209	54	172
35	1069	218	36	144
	1070	225	45	153
	1071	233	51	163
	1072	219	76	138
	1073	234	97	156
	1074	219	109	130
	1075	233	131	146
40	1076	220	142	118
	1077	232	159	133
	1078	219	167	98
	1079	234	183	119
	1080	220	190	78
	1081	234	203	97
	1082	220	205	56
45	1083	225	215	61
	1084	233	218	70
	1085	239	194	55
	1086	254	198	61
	1087	254	205	58
	1088	244	199	62
50	1089	195	183	166

EP 0 475 554 A2

	1090	195	182	164
	1091	254	206	71
	1092	239	174	73
	1093	246	183	84
5	1094	254	194	95
	1095	240	148	95
	1096	248	160	104
	1097	254	169	115
	1098	241	116	112
	1099	245	127	120
	1100	254	139	126
10	1101	240	77	124
	1102	249	94	132
	1103	254	105	137
	1104	240	37	127
	1105	254	35	125
	1106	254	34	135
	1107	250	50	136
15	1108	254	61	140
	1109	241	33	146
	1110	254	31	144
	1111	254	28	152

_SRV2*DUAI:USERS.SMART.KEIDAR_HMDB.RGB#3

20	1112	249	45	153
	1113	254	56	162
	1114	239	74	140
	1115	248	91	150
	1116	254	102	158
	1117	240	113	133
25	1118	247	124	141
	1119	254	137	149
	1120	238	148	122
	1121	245	158	129
	1122	254	165	135
	1123	197	185	170
	1124	198	185	169
30	1125	239	175	100
	1126	248	186	110
	1127	254	193	121
	1128	239	195	77
	1129	247	201	89
	1130	254	209	100
35	1131	239	211	53
	1132	254	218	54
	1133	254	221	51
	1134	247	217	62
	1135	254	222	72
	1136	217	222	53
	1137	221	233	52
	1138	232	234	50
40	1139	224	228	62
	1140	232	232	69
	1141	220	206	80
	1142	232	220	101
	1143	218	191	99
	1144	233	200	124
	1145	218	168	121
45	1146	232	181	140
	1147	218	145	137
	1148	231	157	153
	1149	218	111	146
	1150	231	130	163
50	1151	217	75	155

EP 0 475 554 A2

	1152	231	95	173
	1153	216	69	161
	1154	221	31	169
5	1155	236	26	190
	1156	220	55	187
	1157	201	191	176
	1158	201	190	176
	1159	231	49	176
	1160	194	70	166
	1161	201	80	174
10	1162	208	94	181
	1163	195	103	157
	1164	208	129	174
	1165	194	137	149
	1166	208	156	161
	1167	195	161	136
	1168	207	181	153
15	1169	194	183	123
	1170	207	197	138
	1171	195	201	100
	1172	208	215	122
	1173	196	218	86

20 -SRV2#DUA1:[USERS.SMART,KEIDAR_MJOB.RGB#3

	1174	201	225	88
	1175	207	230	96
	1176	169	218	108
	1177	179	224	116
25	1178	185	230	125
	1179	165	199	131
	1180	186	213	146
	1181	168	179	143
	1182	186	194	161
	1183	169	154	156
	1184	186	171	174
	1185	171	124	166
30	1186	185	144	183
	1187	169	93	174
	1188	178	104	181
	1189	184	118	190
	1190	143	124	179
	1191	204	194	181
35	1192	204	194	182
	1193	150	134	189
	1194	154	143	199
	1195	142	152	172
	1196	153	171	191
	1197	137	179	164
	1198	153	196	178
40	1199	137	202	151
	1200	154	219	166
	1201	138	221	132
	1202	146	227	141
	1203	154	232	149
	1204	103	220	156
	1205	111	228	163
45	1206	121	237	170
	1207	104	199	171
	1208	121	220	187
	1209	108	177	182
	1210	124	195	203
	1211	112	151	192
	1212	116	160	202
50	1213	124	168	213

EP 0 475 554 A2

	1214	81	179	210
	1215	88	186	221
	1216	92	193	231
5	1217	75	205	195
	1218	89	223	217
	1219	75	227	178
	1220	83	235	185
	1221	89	241	195
	1222	45	241	210
	1223	37	254	221
10	1224	36	254	236
	1225	207	197	186
	1226	207	197	185
	1227	49	249	222
	1228	53	254	235
	1229	45	213	229
	1230	40	221	254
15	1231	37	239	254
	1232	52	222	243
	1233	55	231	254
	1234	39	246	247
	1235	32	254	254

20	_SRV2#DUA1:[USERS.SMART.KEIDAR_HJDR.RGB#3			
	1236	34	254	254
	1237	33	254	254
	1238	40	254	254
	1239	31	254	254
	1240	39	254	254
25	1241	32	254	254
	1242	40	254	254
	1243	32	254	254
	1244	32	254	254
	1245	33	254	254
	1246	34	254	254
	1247	40	254	254
30	1248	45	252	254
	1249	43	254	254
	1250	50	254	254
	1251	70	235	267
	1252	80	241	216
	1253	84	247	227
	1254	75	208	222
35	1255	82	215	235
	1256	86	220	243
	1257	106	176	200
	1258	110	184	207
	1259	211	202	191
	1260	211	202	191
40	1261	121	194	228
	1262	102	203	191
	1263	118	219	213
	1264	101	224	175
	1265	107	232	183
	1266	119	239	191
	1267	138	223	155
	1268	146	230	163
45	1269	154	235	170
	1270	135	203	170
	1271	152	218	187
	1272	139	177	179
	1273	153	194	200
	1274	142	152	191
50	1275	147	161	209

EP 0 475 554 A2

	1276	154	171	214
	1277	170	128	185
	1278	178	137	194
	1279	187	147	203
	1280	169	157	177
5	1281	186	175	195
	1282	168	181	165
	1283	186	195	182
	1284	168	204	152
	1285	186	216	168
	1286	168	221	135
10	1287	178	226	141
	1288	185	233	147
	1289	196	220	107
	1290	201	225	116
	1291	206	230	126
	1292	191	200	127
	1293	214	206	196
	1294	214	207	196
15	1295	209	215	147
	1296	195	184	145
	1297	208	198	162

-SRV2*DUAI:USERS.SHART.KEIDAR_MIDB.RGB#3

20	1298	194	162	156
	1299	209	177	173
	1300	194	138	168
	1301	212	157	184
	1302	197	104	173
	1303	203	116	181
	1304	212	128	191
25	1305	218	74	171
	1306	226	85	179
	1307	233	98	184
	1308	219	112	161
	1309	233	130	179
	1310	218	143	152
30	1311	233	156	169
	1312	219	170	141
	1313	232	179	161
	1314	219	188	126
	1315	233	199	146
	1316	219	207	104
	1317	232	220	129
35	1318	218	222	82
	1319	225	228	94
	1320	232	234	105
	1321	239	224	55
	1322	254	226	52
	1323	244	234	50
	1324	247	228	48
40	1325	254	227	47
	1326	242	232	49
	1327	216	211	202
	1328	217	211	202
	1329	254	236	46
	1330	254	236	43
	1331	254	235	40
45	1332	254	236	49
	1333	249	228	58
	1334	254	229	61
	1335	249	235	60
	1336	254	238	59
	1337	249	228	67

EP 0 475 554 A2

	1338	254	239	65
	1339	254	237	72
	1340	241	210	83
	1341	248	216	96
5	1342	254	224	110
	1343	242	196	107
	1344	249	201	118
	1345	254	205	130
	1346	242	173	129
	1347	251	183	136
	1348	254	190	142
10	1349	241	148	141
	1350	250	158	151
	1351	254	166	158
	1352	241	113	153
	1353	250	126	160
	1354	254	139	160
	1355	242	76	161
15	1356	250	90	170
	1357	254	100	177
	1358	241	32	163
	1359	254	29	163

_SRV2\$DUAL:(USERS.SMART.KEIDAR_MJDB.R6813

20	1360	244	28	170
	1361	218	213	206
	1362	218	213	206
	1363	252	25	163
	1364	254	25	163
	1365	252	41	170
25	1366	254	42	169
	1367	253	22	167
	1368	254	24	167
	1369	254	21	164
	1370	254	27	169
	1371	254	27	169
	1372	253	39	175
30	1373	254	39	175
	1374	252	44	173
	1375	254	47	179
	1376	254	60	182
	1377	242	72	178
	1378	254	67	189
	1379	250	90	187
35	1380	254	92	193
	1381	254	98	194
	1382	242	110	169
	1383	250	122	178
	1384	254	135	186
	1385	240	146	159
	1386	248	156	167
40	1387	254	163	173
	1388	240	171	149
	1389	248	178	157
	1390	254	187	163
	1391	240	192	133
	1392	248	197	139
	1393	254	203	146
45	1394	236	207	107
	1395	220	217	211
	1396	221	217	211
	1397	247	218	123
	1398	254	224	135
	1399	238	224	87

50

55

EP 0 475 554 A2

	1400	254	241	85
	1401	242	231	102
	1402	254	243	108
5	1403	254	243	113
	1404	218	223	108
	1405	224	229	119
	1406	231	234	131
	1407	217	205	134
	1408	233	220	151
	1409	217	190	150
10	1410	232	199	167
	1411	218	171	160
	1412	231	179	181
	1413	218	143	170
	1414	232	155	189
	1415	219	111	177
	1416	225	119	185
15	1417	232	130	194
	1418	197	136	189
	1419	205	147	198
	1420	212	158	206
	1421	195	162	180
_SRV2\$DUA1:[USERS.SMART.KEIDAR.F]DB.RGB;3				
20	1422	210	180	197
	1423	195	182	186
	1424	208	197	184
	1425	194	203	153
	1426	206	216	167
25	1427	194	220	140
	1428	199	224	143
	1429	228	223	217
	1430	228	223	216
	1431	208	233	153
	1432	170	224	159
	1433	178	229	165
30	1434	184	238	170
	1435	168	206	173
	1436	184	218	188
	1437	168	183	185
	1438	185	197	203
	1439	168	158	195
	1440	179	168	208
35	1441	185	177	214
	1442	138	179	204
	1443	147	187	214
	1444	153	194	228
	1445	138	204	191
	1446	152	220	214
	1447	140	226	177
40	1448	146	232	187
	1449	153	236	193
	1450	105	228	201
	1451	111	233	212
	1452	119	242	224
	1453	105	204	220
	1454	109	213	235
45	1455	118	219	247
	1456	74	235	241
	1457	64	254	254
	1458	80	240	251
	1459	78	250	254
	1460	84	247	254
50				
55				

EP 0 475 554 A2

	1462	67	247	254
	1463	233	227	220
	1464	232	227	220
	1465	103	239	243
	1466	103	232	254
5	1467	109	251	254
	1468	132	228	200
	1469	139	234	210
	1470	146	240	221
	1471	134	204	217
	1472	142	211	230
	1473	147	220	242
10	1474	167	184	204
	1475	177	191	213
	1476	185	197	224
	1477	166	205	192
	1478	183	220	212
	1479	168	226	179
	1480	175	230	186
15	1481	183	236	193
	1482	195	223	159
	1483	203	229	167

_SRV2#DUA1:[USERS.SMART.KEIDAR.MJDB.RGB#3

20	1484	210	234	174
	1485	196	204	175
	1486	208	219	193
	1487	196	185	190
	1488	208	200	208
	1489	196	164	199
	1490	204	174	207
25	1491	211	181	216
	1492	218	142	189
	1493	225	153	197
	1494	231	155	201
	1495	212	163	175
	1496	229	177	194
	1497	237	229	224
30	1498	238	229	224
	1499	215	188	170
	1500	229	200	185
	1501	216	204	158
	1502	233	223	171
	1503	216	223	140
	1504	223	230	146
35	1505	232	238	152
	1506	240	227	119
	1507	254	245	123
	1508	247	234	120
	1509	254	246	134
	1510	254	248	137
	1511	240	210	140
40	1512	247	218	148
	1513	254	225	155
	1514	240	192	155
	1515	246	200	164
	1516	254	208	172
	1517	240	170	167
	1518	247	179	176
45	1519	254	198	185
	1520	240	147	176
	1521	248	156	184
	1522	234	163	192
	1523	240	111	193

50

55

EP 0 475 554 A2

	1524	234	109	197
	1525	248	122	181
	1526	254	129	200
	1527	254	135	199
5	1528	240	144	191
	1529	254	146	201
	1530	243	154	198
	1531	241	232	227
	1532	240	233	228
	1533	254	159	207
	1534	254	160	205
10	1535	237	168	183
	1536	246	179	192
	1537	253	191	194
	1538	237	189	194
	1539	245	200	182
	1540	253	209	180
	1541	238	211	161
15	1542	246	219	168
	1543	254	228	176
	1544	239	229	144
	1545	254	248	148

_SRV2*DUA1:USERS.SMART-KEIDAR_H3DB.RGB13

20	1546	247	236	150
	1547	254	248	157
	1548	254	247	159
	1549	218	226	164
	1550	226	235	169
	1551	232	241	175
25	1552	217	207	178
	1553	228	221	192
	1554	218	188	191
	1555	230	204	206
	1556	219	169	200
	1557	225	175	207
30	1558	232	181	216
	1559	196	187	208
	1560	202	193	216
	1561	207	198	226
	1562	195	208	196
	1563	208	222	215
	1564	191	223	177
35	1565	245	237	234
	1566	246	237	233
	1567	200	232	189
	1568	208	238	199
	1569	164	226	201
	1570	173	234	209
	1571	182	239	218
40	1572	165	205	217
	1573	175	211	226
	1574	182	219	240
	1575	130	227	231
	1576	123	248	254
	1577	135	237	243
	1578	139	246	254
45	1579	144	244	254
	1580	161	227	226
	1581	161	243	254
	1582	170	234	239
	1583	177	245	251
	1584	177	243	252
50	1585	193	297	206

EP 0 475 554 A2

	1586	204	235	213
	1587	210	239	223
	1588	193	207	219
	1589	200	212	229
	1590	207	218	238
	1591	217	190	210
5	1592	223	196	219
	1593	231	204	227
	1594	214	209	199
	1595	227	223	216
	1596	215	229	183
	1597	221	234	189
	1598	226	239	196
10	1599	246	243	242
	1600	245	243	241
	1601	239	232	167
	1602	254	249	169
	1603	245	239	173
	1604	254	250	179
	1605	254	250	180
15	1606	236	212	180
	1607	244	220	189

_SRV2\$DUA1:[USERS.SMART.KEIDAR.MJDR.RGB;3

	1608	254	229	197
20	1609	237	193	192
	1610	246	204	196
	1611	252	212	201
	1612	239	170	202
	1613	254	175	209
	1614	247	179	208
25	1615	254	190	212
	1616	253	188	214
	1617	238	193	211
	1618	254	200	224
	1619	248	203	217
	1620	254	210	233
	1621	254	210	234
30	1622	235	212	199
	1623	247	221	207
	1624	254	230	214
	1625	237	231	184
	1626	254	251	192
	1627	248	241	193
	1628	254	253	201
35	1629	254	253	202
	1630	214	228	207
	1631	221	236	214
	1632	230	246	220
	1633	247	246	247
	1634	247	246	247
	1635	215	209	220
40	1636	223	216	228
	1637	227	219	237
	1638	190	227	226
	1639	188	244	251
	1640	197	234	237
	1641	202	243	249
	1642	201	243	251
45	1643	214	227	228
	1644	213	242	250
	1645	219	235	237
	1646	223	245	249
	1647	224	244	245

50

55

EP 0 475 554 A2

1648	234	229	205
1649	254	252	212
1650	246	240	212
1651	254	252	223
1652	254	251	225
1653	236	212	218
1654	254	212	236
1655	244	215	226
1656	254	217	240
1657	254	219	242
1658	235	230	226
1659	242	240	230
1660	254	238	251
1661	245	254	253
1662	245	239	237
1663	246	238	236
1664	250	237	233
1665	242	250	237
1666	242	241	230
1667	246	247	247
1668	246	247	247
1669	246	240	249

_SRV2\$DUA1:[USERS.SMART.KEIDAR_MJDB.RG813

1670	252	240	249
1671	245	252	252
1672	246	246	246
1673	246	247	247
1674	246	247	248
1675	246	247	247
1676	246	246	248

=====

APPENDIX E

TRANS/4 USER GUIDE

Important Notice

5

Restrictions on the use of this document:

10

This document is delivered subject to the following conditions and restrictions:

15

This documentation contains proprietary information of SCITEX CORPORATION, LTD. Such information is hereby supplied solely for the purpose of assisting explicitly and properly authorized users of the RESPONSE series of SCITEX systems in the proper operation of SCITEX equipment. Without the express prior written permission of SCITEX, no part of the contents hereof may be used for any other purpose, disclosed to any person or firm, or reproduced by any means.

20

The text and drawings herein are for the purposes of illustration and reference only. The specifications on which they are based are subject to change without notice.

25

Document No.771-9A005
Copyright © 1990 by
SCITEX CORPORATION, LTD.
All rights reserved.

30

Preliminary: December 1990

35

Trademarks:

40

Color Key®, Cromalin®, Agfaproof™

45

50

55

1. TRANS/4 OPERATION

1.1 INTRODUCTION TO TRANS/4

TRANS/4 is used for color proofing on the Iris Printer and consists of software that is resident on a Scitex workstation.

The Iris printer, together with the Scitex workstation, consistently gives an accurate reproduction of the press system which would be used on a final printing job. TRANS/4 sends picture data files from the workstation directly to the Iris printer, eliminating the need to generate films for each separation. Instead of spending several hours producing a color proof from films (e.g. Cromalin, Matchprint, etc.), the Iris printer produces a precise proof in only minutes and at a fraction of the cost.

5

FACTORY-SET CALIBRATIONS

10

TRANS/4 has been calibrated at the factory to simulate several proofing and printing systems. A specific list of these systems is provided with the magnetic tape which is supplied with the TRANS/4 system.

15

For every factory-calibrated system, a corresponding Color Transform file (type NDL) is supplied on the magnetic tape. When applying a particular Color Transform to a page, a color match of the target printing system is obtained. Proofing is a matter of simply specifying the appropriate Color Transform file when printing to the Iris.

20

CUSTOM CALIBRATIONS

25

One of the powerful features of TRANS/4 is its capability of being calibrated to most any printing environment. The user can optionally create his own Color Transforms in order to simulate a non-standard (not supplied by Scitex) press system. To do this, the Custom-Calibration Procedure (Chapter 3.) must be performed.

30

35

40

45

50

55

5

The Calibration Procedure

10

The calibration procedure is required once per target printing process and not each time a proof is output. As long as the final printing process or conditions do not change, the system is calibrated for that process (see Chapter 3. Custom Calibration).

15

20

Calibration consists of several procedures which require the use of a colorimeter. A reference pattern is printed on the target press system via films as well as directly to the Iris printer. The goal of calibration is to produce a proof which matches the press print. These two outputs are measured precisely and data is entered into the Scitex workstation. TRANS/4 is then able to create the appropriate Color Transform.

25

30

Once the calibration procedure is complete and there is a proper match, the system need not be calibrated for that printing process again. TRANS/4 is capable of storing virtually an unlimited number of sets of calibration data which reflect different printing processes. By specifying the desired data set, the Iris can simulate, on-the-fly, any printing process which has been previously calibrated.

35

40

45

50

1-3

Introduction

55

5

10

1.2 PRINTING ON THE IRIS PRINTER

15

To output Scitex files onto the Iris printer, a command originating from the Iris Front-End-Processor (FEP) must first be sent to the Whisper workstation. This makes sure that the FEP is ready and waiting to receive the data to be printed.

20

Next, from the Whisper workstation, the command to begin proofing is sent to the FEP. A CT, LW or Final Layout file could be printed. A Color Transform file could also be specified so that the proof obtained, simulates some target printing method.

25

STEP 1. THE IRIS PRINTER

30

Place a sheet of paper onto the drum of the Iris Color Printer. (Read your Iris Operator's Manual for details.) Close the hood and put the printer on-line.

35

STEP 2. THE IRIS FEP

40

From the Iris FEP keyboard, select I/O AND FILES. Then select Pipe. This command ensures that the FEP is ready to receive data. Make sure that CLT and HUE fields have been disabled via the EDIT selection. The following screen appears:

45

50

55

Operation

Trans/4

5

10

15

20

25

Enter the following parameters ,if necessary, and continue to step 3.

Enable Scaling

30

Change this field to YES in order to scale the file on the fly. Usually, this field would be set to NO and any scaling will be done on the Scitex workstation.

Title, Subtitle

35

These fields allow you to add two lines of labels outside the print area of the proof. Enter information here such as the file name, color transformation, date, etc.

You may enter Edit before selecting I/O and Files in order to change parameters such as Offset, etc.

40

45

50

1-5

Printing on the Iris

55

Trans/4

Operation

5

STEP 3. THE SCITEX STATION

10

On the Whisper, Select Start Work and choose the name of the file to be proofed. From the pop-up menu, select Proof to proof to the Iris printer. LW, CT and Final Layout files may be proofed. Note, that the Color Transform file (NDL) must be located either in the "Public" table or in the current Job and Page you are working on.

15

20

25

30

35

40

Enter the parameters which are pertinent to your printing requirements and select the Proof softkey to initiate the printing. At this point you may continue your other work and the printing will continue in the background. When printing is complete a message will be flashed on your screen.

45

50

Printing on the Iris -

1 - 6

55

5

PARAMETERS TO BE ENTERED

10

NDL

Type the name of the Color Transform to apply to the file to be printed, if any.

15

Excurve File

If you do not use the factory default, type the name of the Excurve which has been created. (Refer to Chapter 3, Custom Calibration.)

20

PROOF

Pressing this softkey sends the page data to the Iris printer, via the FEP.

At the FEP, you will be prompted to press ENTER .

25

QUIT

Pressing this softkey aborts the operation.

30

Paper Size

The paper size is fixed to 600 x 600 mm for Iris 3024;
863 x 1189 mm for Iris 3047; and 305 x 457 mm for Iris Smartjet
4012.

35

File Size

These fields display the height and width of the selected file.

40

Output Size

The default output size is the size of the selected file. Change these values in order to scale the picture up and down. Output size may not exceed the paper size. Changing this field changes the Scale Factor field.

45

Scale Factor

To enlarge or reduce the picture. Changing this field changes the Output Size field.

50

55

Trans/4

Operation

5

Gradation

Type the name of the gradation curve to be applied to the file, if any.

10

MTX

Type the name of the Matrix to be applied to the file, if any.

15

20

25

30

35

40

45

50

Printing on the Iris

1 - 8

55

2. TRANS/4 INSTALLATION

2.1 HARDWARE

TRANS/4 requires the following equipment:

- Any Whisper Cabinet with four available slots to accommodate the following required boards:
 - HSP (High Speed Processor - 2 boards)
 - PM (Picture Memory) Board
 - GPIB Board (Handshake)
 - SCD Board (attaches to CPU board)
- Iris 3024/3047/4012 Color Ink Jet Proofer
- Iris Front-End-Processor (FEP)
- X-Rite 918F Colorimeter (optional)
- Cable for X-Rite - SCD connection

5

The figure on the next page shows how the equipment is connected. The Iris Color Ink Jet Proofer is connected to the Iris front-end-processor (FEP) as explained in the Iris Operator's Manual.

10

The Iris FEP is linked to the Whisper by way of the GPIB board and cable.

15

The X-Rite colorimeter connects to the Whisper via a cable to the SCD board.

NOTE:

20

- When using the X-RITE Colorimeter connected to the SCD, make sure FCO #12637 was performed.
- Refer to Appendix I, HSP Installation Procedure for installation instructions for the High Speed Processor Board.

25

30

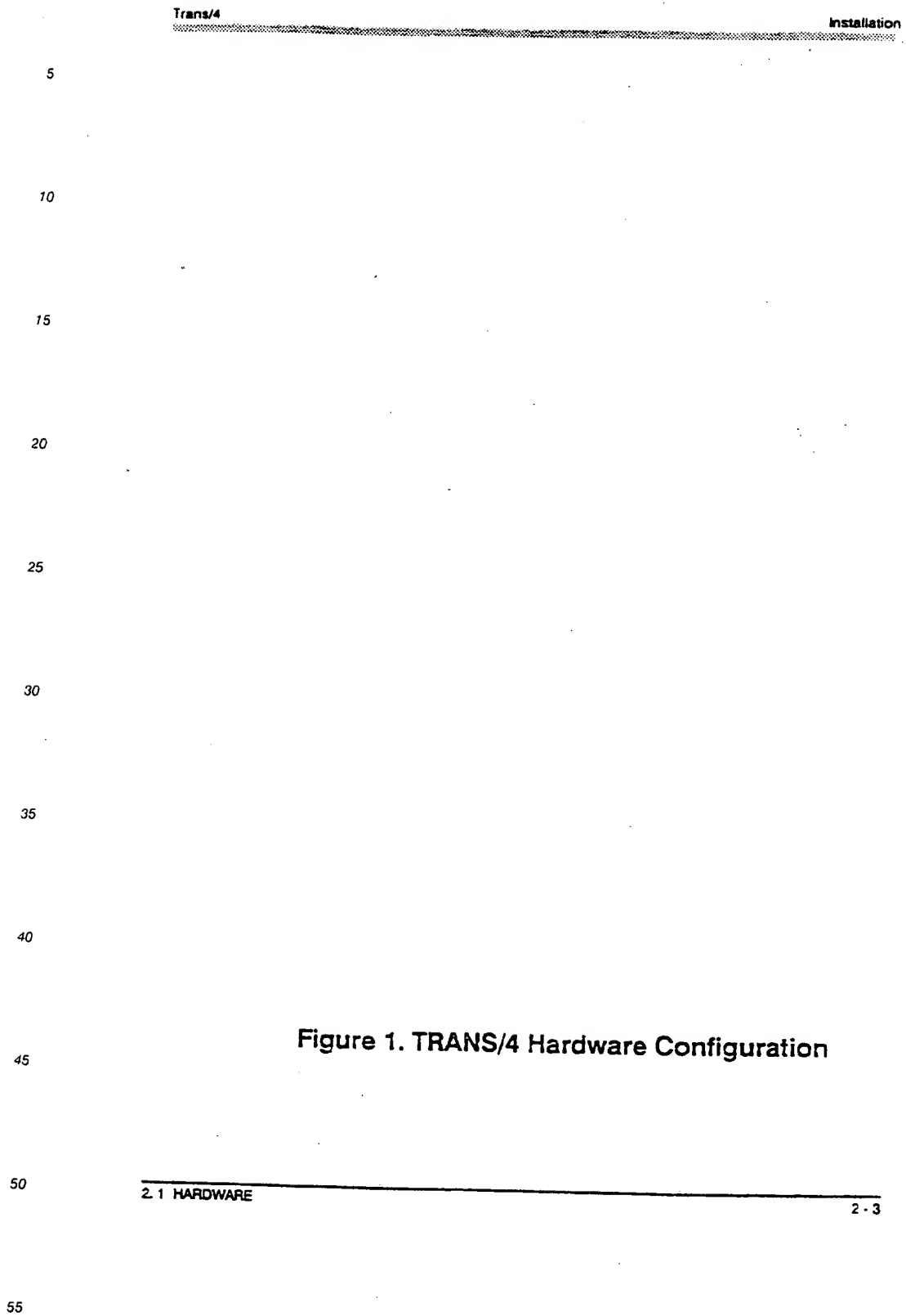
35

40

45

50

55



5

10

2.2 SYSTEM CONFIGURATION

15

When performing System Configuration, the TRANS/4 option must be enabled along with assigning the printer logical name (Iris) to a physical GPIB channel number. All this is accomplished through the following series of dialogues:

20

First, press **System, Services and Configuration** softkeys from the I/O workstation in order to access the System Configuration Main Menu.

25

30

35

40

45

From the System Configuration Main Menu, press the **Secur. Info** softkey and the following screen appears:

50

2 - 4

2.2 SYSTEM CONFIGURATION

55

5

10

15

20

25

30

35

40

45

50

55

The password for your system must be obtained from your Scitex Subsidiary Administrator. Be prepared to give him the serial # and workstation configuration. Set the options as they apply to your system, making sure that *HandShake* and *TRANS/4* are set to "YES". Press the Main Menu softkey to bring you back to the System Configuration Main Menu. From there press the Station Config and then Handsk Config softkeys to bring up the screen for setting up the Iris communications channel.

Installation

Trans/4

5

10

15

20

Press the GPIB softkey and the following screen appears:

25

30

35

40

Set the *GPIB Address 1* field to the channel number that the Iris printer is physically connected to on the GPIB board. Values may range from 1 - 4. Make sure the other parameters are set as shown.

45

2 - 6

2.2 SYSTEM CONFIGURATION

50

55

5

10

The next step is to assign this physical channel number to the Iris logical name. To do this press the **Main Menu** softkey which brings you back to the System Configuration Main Menu. Press the **Logical Names** softkey and the following appears:

15

20

25

30

Press the **Handsk LogNames** key. This brings you to the screen on the next page:

35

40

45

50

55

5

10

15

20

25

30

35

40

45

50

55

Select the *device type* to be "GPIB" by toggling with the space bar. Select the physical channel number (as entered for GPIB configuration previously) under the *Channel Address*. The *Logical Name* should be set to "Iris". Now press the Save & Exit softkey to install all the parameters you have just set. The TRANS/4 system is now configured to run on your workstation.

2.3 COLOR BALANCE

The Color Balance procedure is done once for every Iris Installation. Its purpose is to initialize Iris Ink Jet color densities in order to calibrate your Iris printer to mimic the factory reference. The procedure described in this section should be performed only if Factory-Set Color Transforms will be used when proofing. If you intend to create your own Custom Color Transforms, skip this section and go on to Chapter 3. Custom Calibration.

The following is required for this procedure:

- The Factory-supplied proof of the sample pattern, referred to as the Color Wedge (included with this manual).
- The Color Wedge data file (COLWDG.P), resident on Magtape and supplied with TRANS/4.
- A densitometer (or colorimeter).

The outline of the Color Balance procedure is as follows:

- Measure the factory proof with your densitometer.
- Set the Iris Printer with density values of 100 for CMYB.
- Download the Color Wedge file from magtape to the Scitex station and create a proof of it on your Iris Ink Jet printer.
- Measure your proof and compare it to the factory proof measurements.
- Adjust the Iris density values accordingly.
- Create another proof of the Color Wedge on your Iris printer.
- Measure your proof. It should match the factory proof. If it doesn't, further adjustments may be necessary.

5

10

Color Balance - Detailed Description

15

The Color Wedge is the sample reference pattern which is used when setting the Color Balance on the Iris printer. With every TRANS/4 system, a factory proof of the Color Wedge is supplied. Note that this proof does not reflect the final printing quality and is used strictly for adjustment purposes. A magtape containing the file COLWDG.P is also supplied. Download this file into your workstation disk.

20

25

30

35

% Dot Values

System values

40

1. Measure the Factory Proof

With your densitometer (or colorimeter), measure the factory proof at 100% Dot for each of the four separations. Measure Cyan density for

45

50

2 - 10

Color Balance - Detailed Description

55

5

10

cyan; Magenta density for Magenta; Yellow density for Yellow and Black density for Black. Write these four values down.

2. Set the Iris densities to 100 for CMYB.

15

Set the color densities on the Iris Front-End-Processor (FEP) to 100 for C,M,Y and B. To enter the densities, on the FEP, select SET UP, default configuration, with CLT and HUE disabled. Then select EDIT, Configuration and then Color Balance.

20

25

30

35

40

45

50

Color Balance - Detailed Description

2 - 11

55

5

Set the densities to 100 for Cyan, Magenta, Yellow and Black.

10

15

20

25

3. Create a proof of the Color Wedge on your Iris Printer

30

Make sure you have downloaded the Color Wedge file (COLWDG.P) from the magtape supplied with the system. Select the Proof option (as described in Chapter 1. TRANS/4 Operation), to print the Color Wedge on your system. Make sure you do not specify any gradation, MTX, NDL or Excurve file.

35

4. Measure your proof

40

With the densitometer, measure your proof starting with Cyan at 100% Dot. If your measurement here matches the factory proof measurement (as described in step 1.) then the Cyan density setting may remain at 100. If, however, it does not match, do the following: locate the position on your proof for Cyan where the densitometer reading is

45

50

55

5

10

the same as was measured from the factory proof at 100% Dot. This position on the scale represents the density which should be set. Write down the value and repeat the procedure for Magenta, Yellow and Black.

An Example

15

20

Suppose you measure the density of Cyan at 100% Dot on the factory proof and its value is 1.8. On your site's proof you locate density 1.8 for Cyan at the 80% Dot location on the Color Wedge. That means, you must set the Iris density for Cyan to be 80. The same procedure should be applied to the other colors.

25

30

35

40

45

50

55

5

5. Adjust Iris Densities

10

After all density values have been determined, enter them into the FEP as was described in Step 2.

6. Create another proof

15

Output the Color Wedge once again, using the new density settings.

7. Measure your new proof

20

Measure the 100%Dot value for C,M,Y and B on your proof. These values should now closely match the values measured on the factory proof. If they don't, try to further adjust the Iris density settings by repeating steps 5. and 6. until the measurements are approximately equal.

25

8. Measure intermediary values on your proof

30

Once you are satisfied with matching 100%Dot values of the factory proof and your site's proof, measure several intermediary points (between 0%Dot and 100%Dot) on both proofs. Verify that they are "close." If there are wide discrepancies, it is possible that the Excurve supplied with TRANS/4 is not adequate for your system. It may, therefore, be advisable to create a new Excurve. Refer to the *Creating an Optimal Excurve* section of Chapter 3. Custom Calibration, for instructions on how to create this Excurve.

35

40

45

50

55

3. CUSTOM CALIBRATION (Optional)

Calibrating TRANS/4 is essential only when simulating a printing system whose Color Transform has not been supplied by the factory. The complete list of factory-calibrated Color Transforms is provided with the magnetic tape which is supplied with the TRANS/4 system.

Overview

When calibrating, it is necessary to establish that the Iris proofing system will simulate the press system being used.

The calibration methods described in this chapter adjust color parameters so that the Iris proofing system will consistently give an accurate reproduction of the desired printing method. The three procedures necessary for custom calibrations are:

- Adjusting The Color Balance
- Creating An Optimal Excurve
- Creating A Custom Color Transform

5

10

3.1 ADJUSTING THE COLOR BALANCE

15

This is the Color Balance procedure which is done when creating a custom Color Transform. (It replaces the Color Balance Procedure described in Chapter 2. Installation.) Its purpose is to initialize specific color parameters in order to achieve optimal results when proofing. It is done only once. If different Color Transforms are needed to be created, this adjustment does not have to be re-done.

20

In order to adjust the color balance, a sample pattern called the Color Wedge is printed on the Iris. This is provided by Scitex on magtap. With the aid of a colorimeter, the luminances will be measured. This section gives you a step-by-step approach to entering the proper data into the system.

25

30

35

40

45

3-2

3.1 ADJUSTING THE COLOR BALANCE

50

55

5

THE CIELAB COLOR SYSTEM

10

Since color is a matter of personal perception and therefore subjective, a method of objectively appraising the color spectra must be used. Several reference systems exist and we have chosen to use the CIELAB color system when performing color match between proof and print.

15

The CIELAB space is a 3 dimensional uniform color space whose coordinates represent:

20

- "L", the luminance of a color;
- "a", the redness/greeness of a color;
- "b", the yellowness/blueness of a color.

25

With the aid of a colorimeter, a color can be uniquely defined and measured by these three values. Refer to the figure below which shows a 2 dimensional "slice" of the CIELAB color space where the L (luminance) value is held constant.

30

35

40

45

50

55

5

THE COLOR WEDGE

10

The Color Wedge is the sample reference pattern which is used when setting the Color Balance on the Iris. With every TRANS/4 system, a magtape containing the file COLWDG.P is received.

15

When this Color Wedge is printed, it appears as a pattern of 4 color strips (CMYB) with the lightness of points (luminance) varying over a range of 0 - 100% dot (or 255 - 0 when system values are used).

20

25

30

35

40

45

50

55

5

10

Set Densities on the Iris

The first step is to create a proof of the Color Wedge by outputting the COLWDG.P file to the Iris Printer. Refer to Chapter 1. for instructions on how to print files on the Iris printer.

15

Next, using the X-Rite 918 Colorimeter (refer to X-Rite Operation Manual), measure the luminance (L value on the X-Rite display) at 100% dot for Cyan. Write down this value on the form provided on the next page. Move the colorimeter down the scale by 5% dot to the 95% dot position. Measure the luminance and write it down. Continue measuring at 5% dot increments until you reach 50% dot. (Fewer measurements can be made at the middle range.)

20

25

Starting from 100% dot and going down, try to notice where the luminance values steadily rise. The place on the % dot scale where the luminance begins to increase consistently represents the the density value which should be set on the Iris FEP.

30

Repeat this procedure for Yellow, Magenta and Black

35

40

45

50

55

Custom Calibration

Trans/4

5

Baseline Density/ Luminance

10

15

20

25

30

35

40

45

50

55

% Dot	CYAN	MAGENTA	YELLOW	BLACK
100 %				
95				
90				
85				
80				
75				
70				
65				
60				
55				
50				
45				
40				
35				
30				
25				
20				
15				
10				
5				
0				

Date: _____

Name: _____

Drum Speed: _____

Paper: _____

3 - 6

Set Densities on the Iris

Trans/4

Custom: Calibration

An Example

Suppose the luminances were measured for CMYB and the following form was filled in with this data.

Baseline Density/ Luminance

% Dot	CYAN	MAGENTA	YELLOW	BLACK
100 %	55.77	50.02	88.11	11.69
95	55.49	49.81	87.46	10.48
90	55.54	50.02	88.06	10.99
85	55.75	49.90	87.69	10.42
80	55.63	* 50.11	87.99	11.49
75	* 55.42	50.46	87.69	9.33
70	58.18	51.48	* 87.85	* 12.08
65				
60	60.69	53.73	88.34	17.22
55				
50	63.66	55.84	88.69	22.51
45				
40				
35				
30				
25				
20				
15				
10				
5				
0				

Set Densities on the Iris

3 - 7

5

10

Find the low point, or minimum, at which the luminance values start to steadily rise. Look at our example: after some initial fluctuation, the luminance rises steadily at 75% dot for Cyan from a minimum value of 56.42. Likewise, for Magenta, the low point would be at 80% dot. For Yellow - 70% dot and for Black - 70% dot.

ENTER THE DENSITY DATA

15

To enter the new densities on the Iris FEP, select SET UP, default configuration, with CLT and HUE disabled. Then select EDIT ,Configuration and then Color Balance .

20

25

30

35

40

45

50

55

EP 0 475 554 A2

Trans/4

Custom Calibration

5

The following screen appears. Enter the new density values into the FEP:

10

15

20

25

30

Make sure that the Contrast field remains set to 100.

35

40

45

Set Densities on the Iris

3 - 9

50

55

5

10

3.2 CREATING AN OPTIMAL EXCURVE

15

This procedure creates an Excuse which is necessary for creating Color Transforms. Steps 1-5 outlined below, need only be done once - before creating the first custom Color Transform. Afterwards, it need not be repeated. Steps 6 - 9, however, require a press system print and need to be re-done for every custom Color Transform.

20

Before creating an Excuse, be sure that you have read the previous section of this chapter and have already adjusted the Color Balance on the Iris printer.

25

To create the Excuse, follow the steps below:

1. Create a Proof

30

Create a new proof of the sample Color Wedge pattern or use the last proof which was produced when *Adjusting the Color Balance*. If you create a new proof, make sure that the newly adjusted densities have been entered (as described in the previous section of this chapter), before printing.

35

2. Set up the Colorimeter

40

Set-up the X-Rite colorimeter as described in the X-Rite Operation Manual. The "store data" function must be activated and cleared of all previous measurements. Select the L.a.b measurement scale. Set illuminant to D50/10 deg if you are using a viewing box with a color temperature of 5000 deg K or set D65/10 deg for 6500 deg K.

45

50

55

5

3. Measure the Color Wedge Proof

10

The order in which you measure is important. Starting at 100% dot for Cyan, measure the luminance with the colorimeter. Now measure Magenta at 100% dot, Yellow at 100% dot and then Black at 100% dot. Continue measuring in this order at 5% dot intervals until you reach 0% dot (e.g. 95%, 90%, 85%, ...etc).

15

4. Download the Measurements

When all 84 points have been measured, you may now transfer the data to the Sctex workstation.

20

Connect the X-Rite colorimeter to the Whisper via the supplied cable. The cable connects to the socket on the SCD card. Verify that the X-Rite is set to Baud Rate 9600, RCI = ON, CR with no Line Feed, and X-On/X-Off enabled. (See "RS232 I/O Parameters" section of the X-Rite Operation Manual.)

25

Next, on the Whisper station, select Table, New Table and choose Colorimeter. The following screen is displayed:

30

35

40

45

50

55

5

10

Type in a new name for the measurements file leaving the colorimeter field set to X-Rite 918. Press the **Receive Measures** softkey and the data transfer will take place. To monitor the progress, look at the X-Rite display.

5. Calculate the Excurve

15

On the Scitex workstation, select **Table**, **New Table**, then choose **Auto LUT**. The following screen appears:

20

25

30

Enter the following parameters:

35

file: The new Excurve name (type LUT). This is the output of the function.

Proof Measurements file: The name of the measurements file downloaded (step 4.).

40

Print Measurements file: leave blank

45

50

55

5

Press Save & Exit softkey and the new Excurve will be calculated for Cyan, Magenta and Yellow.

10

The steps which follow are for the black separation of the Excurve.

6. Create a print of the Color Wedge on the target press system

Using the COLWDG.P file, create a print on the desired press system.

15

7. Measure the print

20

Starting at 100% dot, measure the luminance of black on the print. Write it down on the form provided on the next page. Continue to measure and note the luminance values at 5% dot intervals until you reach 0% dot.

8. Work with the Iris Proof

25

Begin by looking at the "Excurve Data Gathering" form and reading the luminance value that was previously measured from the print at 100% dot. Now start working on the Iris proof with the colorimeter. Locate this value (or closest value) on the last Iris Proof. Note the location on the %dot scale and enter it on the corresponding line of the form provided.

30

Repeat this for all the 21 luminances which have been measured on the print.

35

40

45

50

55

Custom Calibration

Trans/

5

10

15

20

25

30

35

40

45

50

55

EXCURVE DATA GATHERING

BLACK

% Dot

PRINT:
Measured
LuminancePROOF:
% dot
of corresponding luminance

100 %		
95		
90		
85		
80		
75		
70		
65		
60		
55		
50		
45		
40		
35		
30		
25		
20		
15		
10		
5		
0		

Table Name _____ Date: _____ By: _____

Density (CMYB) _____ Drum Speed: _____ Paper Type _____

Trans/4

Custom Calibration

5

An Example:

10

In the example below, the luminance measured on the print at 95% dot for black was 14.67. On the Iris proof the luminance of 14.50 was found to be the closest. This occurred at the 86% dot location on the scale. The form would be entered as shown below:

15

20

25

30

35

40

45

3.2 CREATING AN OPTIMAL EXCURVE

3 - 15

50

55

5

9. Entering the Data for Black

10

To enter the data you have just determined for black, select the Excurve file (LUT file which you created in step 5) from the Library list. The following screen appears:

15

20

25

Press the List/Modify softkey which brings you to a screen which typically, would look like this:

30

35

40

45

50

55

EP 0 475 554 A2

Trans/4

Custom Calibration

5

For each of the 21 points, a new value for black must be entered. To do this, press the Change softkey. This version of the screen appears:

10

15

20

25

The system prompts you for the point number. The point number refers to the line # located under the "#" heading. After entering a line number, press the confirm change softkey. The values which currently exist for that line are displayed:

30

35

40

45

3.2 CREATING AN OPTIMAL EXCURVE

3 - 17

50

55

5

10

15

You are also prompted to enter the new data. The values under "On Scanned File" should not be changed therefore skip over to the "On Scanner" column by pressing the ENTER key. Use the cursor (—>) key here to skip over to change the Black entry, leaving CMY as they appear. For black, enter the values that you filled in on the right-most column of the "Excurve Data Gathering" form ("Proof: %Dot of corresponding luminance"). The left-most column of the form ("%Dot") corresponds to the values of the "On Scanned File" entries on the screen.

20

To continue, press Another softkey and repeat the procedure until the black value for all 21 points have been modified. Once this is done, the Excurve is complete.

25

30

35

40

45

50

55

5

10

3.3 THE COLOR TRANSFORM

The Color Transform performs a color translation of a CT, LW or Final layout file, so that an Iris proof of this file will closely resemble the final press print.

15

Several Color Transforms have already been created at the factory to simulate some popular proofing and printing systems. These include: Matchprint, Cromalin, Offset, Gravure.... A magnetic tape containing the corresponding Color Transform files (type NDL) is supplied with every TRANS/4 system. Read this section to create a Color Transform for some other printing method.

20

25

Color Transforms are created by matching an Iris reference proof to a press reference proof (hereafter referred to as the "print"). The print is obtained by printing the color separations on the press with the same ink, paper and speed as would be used on the final job.

In this section, we will discuss ways to :

30

- Create a Color Transform
- Evaluate a Color Transform
- Edit a Color Transform
- Manipulate a Color Transform
- Apply a Color Transform to a Page

35

40

45

50

55

5

10

3.3.1 Creating a Custom Color Transform

The inputs to the Color Transform Function are:

15

- a set of colorimeter measurements taken from a sample pattern that was printed on the Iris printer (referred to as "proof").
- a set of colorimeter measurements taken from the same sample pattern that was printed on the desired press (referred to as "print").

20

The output of the Color Transform function is:

- a special Color Transform file (type NDL) which, when applied to a CT, LW or Final Layout, produces a color match of the print.

25

30

35

40

45

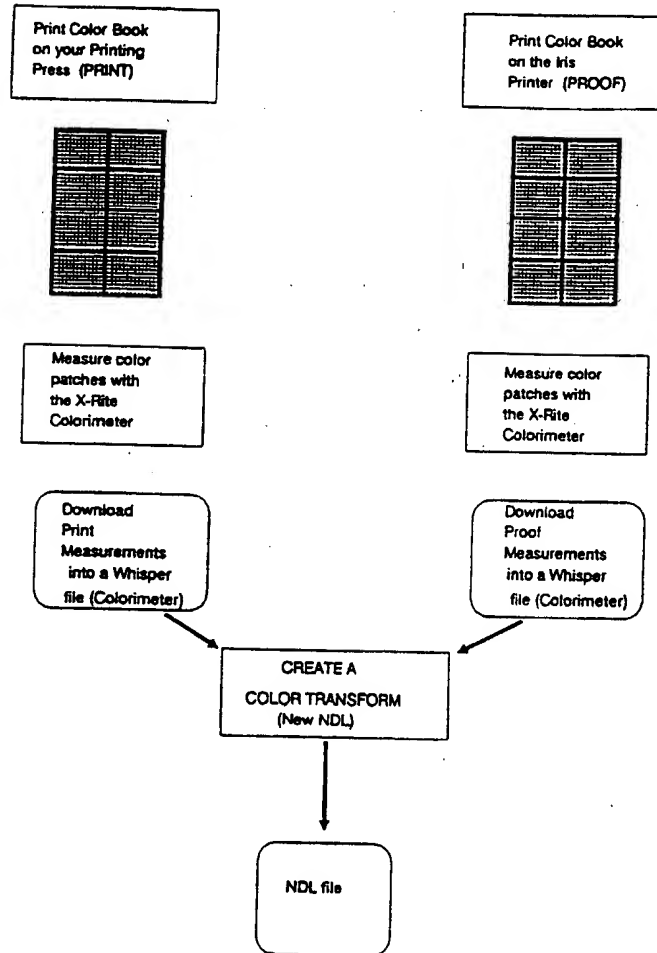
50

55

Trans/4

Custom Calibration (optional)

CREATING A COLOR TRANSFORM



5

To create a Color Transform file, follow the steps below:

10

1. Create a Print and Proof

15

The first step is to create a proof of the sample COLOR BOOK pattern which has been supplied with TRANS/4. Output the COLBOOK.P file to the Iris Printer. (Refer to Chapter 1. for instructions on how to print files to the Iris Printer.) Next, create a print of COLBOOK.P by producing 4 color separations and duplicating the final printing process.

20

2. Set up the Colorimeter

25

Set-up the X-Rite colorimeter model 918. The "store data" feature must be activated and cleared of all previous measurements. Select the L.a.b. measurement scale. Set Illumin to D50/10 deg if you are using a viewing box with a color temperature of 5000 deg K or set D65/10 deg for 6500 deg K.

30

3. Measure the Print

35

The COLOR BOOK pattern consists of a grid of 8 boxes. Each box has a different constant value for yellow and contains 64 patches. Measure the C.I.E $L^*a^*b^*$ of each patch on the print with the colorimeter. Note that this will require 512 measurements. The order in which you measure the patches is very important. Proceed as follows:

40

45

50

55

Trans/4

Custom Calibration (optional)

5

10

15

20

25

30

- First measure the white patch. This corresponds to patch #1 marked on the figure above.

35

- Continue measuring in the order in which the patches are numbered: 2, 3, 4, ...etc. Measure all 64 patches in the box and then proceed to measure the patches in the next box on the right (where $Y = 7$). Continue this until the darkest patch (#512) is measured. If at any point during the measuring, you need to stop, you can easily return to the point where you left off. Read in the last patch number read by the colorimeter by pressing the ILLUM and DIF keys simultaneously on the X-Rite. The measurement number is displayed under the SEND DATA ? message. Select "No" for the queries which follow and then proceed to read the next patch. Refer to the figure on the next page to locate the position from which to continue measuring.

40

45

The Color Transform

3 - 23

50

55

Custom Calibration (optional)

Trans4

COORDINATES SCIEEX TESTABLE

Y=0										Y=1									
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320
321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340
341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360
361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380
381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400
401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420
421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440
441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460
461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480
481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500
501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520
521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540
541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560
561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580
581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600
601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620
621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640
641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660
661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680
681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700
701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720
721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740
741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760
761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780
781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800
801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820
821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840
841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860
861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880
881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900
901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920
921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940
941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960
961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980
981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000

5

4. Download Print Measurements From X-Rite To Whisper

10

When all 512 patches have been measured, you may now transfer the data to the Scitex workstation.

15

Connect the X-Rite colorimeter to the Whisper via the supplied cable. The cable connects to the socket on the SCD card. Verify that the X-Rite is set to Baud Rate 9600, RCI = ON, CR with no Line Feed and X-On/X-Off enabled. (Refer to "RS232 I/O Parameters" of the X-Rite Operations Manual.)

20

Next, on the Whisper, select **Table, New Table** and choose **Colorimeter**. The following screen appears.

25

30

35

40

Type in a new name for the print measurements file leaving the colorimeter field set to X-Rite 918. Press the **Receive Measures** softkey and the data transfer will take place. To monitor the progress, look at the X-Rite display. There will be some delay and then the display will start flashing.

45

50

55

5

5. Measure the Proof

10

Repeat the same procedure for the proof as was described in Step 3. "Measure the Print."

15

>>

Note: When creating a Color Transform for a different printing method, Steps 5 and 6 need not be repeated since this data will not change.

20

6. Download Proof Measurements From X-Rite To Whisper

25

Download the proof data from the X-Rite to the Whisper exactly as was described in Step 4. for the print. Note, however, that the name you assign for the measurements file should be different.

30

35

40

45

50

55

5

7. Calculate the Color Transform

10

On the Scitex workstation, select Table, New Table, then choose New ND. The following screen appears:

15

20

25

When calculating a particular Color Transform for the first time, enter the following parameters:

30

File: Enter a new Color Transform file name
Color Transform file name: LEAVE IT BLANK. (Used for Pass 2)
Proof measurements file: Enter the name as in step 4.
Print measurements file: Enter the name as in step 6.

35

Press the Save & Exit softkey to start the calculation.

40

Notice that the *Color Transform file* name has been left blank. This field is reserved for use when calculating the Color Transform on the 2nd Pass. The 2nd Pass calculation is optional and can be used to produce a Color Transform with possibly closer color match results. The procedure is outlined as follows:

45

50

55

5

PASS 1:

10

- Perform Steps 1 - 6 as described in the previous pages.
- Perform step 7. - Calculate the Color Transform - leaving the *Color Transform file* field blank.
- Press the **Save & Exit** softkey to perform the calculation

PASS 2 (optional):

15

20

- Create an Iris Proof of the Color Book, while applying the Color Transform file created in Pass 1 above.
- Measure this proof with the colorimeter (as described in step 5.).
- Download the proof measurements into a new proof measurements file (as described in step 6).
- Calculate the new Color Transform (step 7) by specifying a new proof measurements file. Also, fill in the *Color Transform file* field with the NDL file name which was just created in Pass 1.
- Press the **Save & Exit** softkey to perform the 2nd Pass calculation.

25

In both passes, the **Save & Exit** softkey is pressed to initiate the calculation. To display the progress indicators, select **show** and then **Bkgd status**. It is then possible to observe the messages indicating the completion of the various stages of the calculation by noting the progress indicator bar graph. Three different bar graphs will appear during the procedure. If the Color Transform has been successfully created and no modifications necessary, then back up this Color Transform file onto magnetic tape.

30

To quit the calculation at any point, select **Abort** located under the bar graph.

35

40

45

50

55

5

10

3.3.2 Evaluating a Color Transform

15

After you have completed the Color Transform calculation, you can evaluate the results by applying the Color Transform to the Color Book CT and printing it on the Iris Printer once again. You can then inspect the proof visually or with the aid of a colorimeter.

20

An alternative approach is to let the TRANS/4 system analyze the results quantitatively. First, create a new proof with the Color Transform applied to the Color Book CT. Using the colorimeter, measure the 512 color patches and download them into a Proof measurements file. Select New NDL (see page 3-27) and fill in any bogus name for the file prompt. (Actually, no new file is created.) Enter the new Proof Measurements file name and the original Print Measurements file name. Pressing the Analyze softkey will display a special screen which gives you an idea of how close your "transformed" proof matches your print. A typical screen may appear as follows:

25

30

35

40

45

50

55

5

10

15

20

25

30

35

40

45

50

55

The units which appear under "D LAB" represent the "size" of the error. The 0 - 1 row represents the smallest possible error. The 1 - 2 row represents errors of a slightly greater magnitude, however they are still undetectable by the human eye. As you continue down the rows, these numbers increase and represent larger and larger errors. The dashed lines which appear next to the error scales represent the number of patches which were found to fall within that error range. Note that for display purposes, the maximum number of errors per error level has been normalized to 10 on this graph.

When most of the errors fall within the 0 - 1, 1 - 2, 2 - 3 or 3 - 4 range, the Color Transform that has been created is quite good. An overall average rating is given as well as the error of greatest magnitude which has been detected.

A large size error (anything greater than 7 - 8) will most likely be due to a bad colorimeter measurement or perhaps due to a non-printable color.

The system provides you with the actual CMYK position of the Color Book for the greatest error detected. This is in the event you wish to edit this particularly troublesome patch.

5

10

3.3.3 Editing a Color Transform

15

The last Color Transform created in the system may be edited. This might be done in order to adjust CMY points which have not been successfully transformed for one reason or another. (Note: Black may not be edited.) To access this function select New NDL (see page 3-27). Enter a new NDL file name leaving the other fields blank. Now, press the Edit softkey to begin editing.

20

25

30

35

40

Start by specifying the units you are working with by toggling with the space bar between " % dot" or "system values". Next, enter the values for C,M,Y,B of the patch to be edited alongside *Near* located at the bottom left portion of the screen. *Note that only points which have been measured with the colorimeter may be edited.* When entering *Near* values, the TRANS/4 system determines the closest location of the point actually measured and displays it alongside the *At : row*.

45

50

55

5

10

15

20

25

30

35

40

45

50

55

Once the closest measured position has been determined, the value of the Color Transform at that position is displayed alongside *Before Edit*. Now, key-in the new values alongside the *After Edit* position. Select **OK** when you are satisfied with your entries by pressing the ENTER key. If you wish to modify any of the keyed-in data, press the SPACE BAR to clear the **OK** and re-enter the data. How to edit points to obtain desired proofing results is a matter of experience as well as trial-and-error and beyond the scope of this manual.

You may continue to make further modifications. As the points are edited they are logged and displayed to the top portion of the screen. The left top portion shows the position of the CMYB point edited and the right top portion contains the values before (*old*) and after (*new*) editing.

When you have completed all modifications, make a back-up copy of the Color Transform file onto magnetic tape.

5

10

3.3.4 Manipulating the Color Transform

Once the Color Transform file (NDL) has been created, there are essentially three possible ways to manipulate it:

15

- Adding Black to an existing Color Transform
- Converting a Color Transform file to a CT
- Converting a CT back to a Color Transform file

20

If any changes have been made to the original Color Transform, it is important to remember to back it up on magnetic tape.

Adding Black To An Existing Color Transform

25

Currently, when creating a Color Transform using the Color Book supplied, the value for black is not transformed. You may optionally add the black transform via the Add Black function. The Color Transform created when black is introduced is derived from the existing NDL file and not measured off a Color Book. To bring up the screen, select Table, New Table and choose Add Black.

30

35

40

45

50

55

5

10

For the *file* field, enter the NDL file name which currently exists (without black). For the *New NDL* field, enter the name of the new Color Transform file which will now include different values of black.

Converting a Color Transform to a CT

15

The advantage to converting an NDL file to a CT file is that once you have a CT you can apply the data correction function that exists for CT's on the Scitex workstation. That is, you can apply a one-dimensional gradation onto the CT. For example, if you wanted to raise Cyan middletone by 5%, you would be able to accomplish this easily on the CT file. This is opposed to editing 512 points on the NDL Color Transform file.

20

25

After some change has been made to the CT file, it may be converted back to an NDL Color Transform file. To convert a Color Transform file to a CT, select Start work on an existing NDL file and the following appears:

30

35

40

45

50

55

Trans/4

Custom Calibration (optional)

5

10

The NDL file name which was previously selected will be displayed.

For the CT File Name field, enter a new name.

Notes:

15

Be sure to use the Add Black function first if you wish to produce a black separation in the CT.

20

When creating a CT file, the %dot values which exist in the Color Transform file are compressed into a smaller range. Therefore, the correspondence between %dot values between NDL (actual) and CT (displayed) files is not one-to-one. The graph below may be used to convert the displayed %Dot values into actual %Dot values. For example, a displayed value of 20% dot has an actual % dot value of 15% dot in the NDL file.

25

30

35

40

45

50

55

The Color Transform

3 - 35

5

Converting a CT back to a Color Transform

10

If a Color Transform file has been converted to a CT and some editing has been done, the file must be brought back to its original form (NDL) in order to effect any changes on proofing.

15

Only files which have been *previously converted* to CT files, via the CT < — NDL function, may be brought back to the Color Transform format. Select Table, New Table and choose CT — > NDL to bring up this screen:

20

25

30

35

For the *File* field, enter a new Color Transform (NDL) file name. For the *CT File Name* field, enter the CT file you wish to convert.

40

45

50

55

5

10

3.3.5 Applying a Color Transform to a Page

15

Once the Color Transform has been set up and finalized it can be applied to a particular page for it to have its effect. Recall that your system can be calibrated to have any number of different Color Transforms which represent different printing environments.

20

To apply a Color Transform to a file, select the **Proof Function**. (This function is described in its entirety in Chapter 1, TRANS/4 Operation.) The inputs to Proof are the CT, LW or Final Layout file to be printed as well as the Excuse and Color Transform file you wish to apply to it. The output is a "transformed" image which is printed directly on the Iris printer.

25

30

35

40

45

50

55

Appendix I - HSP Installation Procedure

5

Introduction

10

The High Speed Processor (HSP) is a high speed co-processor for Whisper based Response systems. It functions as an accelerator for the Response CPU, increasing the speed and efficiency of the system. The HSP operates with all Whisper based Response and Micro-Response configurations.

15

The HSP Kit

20

The HSP (Catalog # 510K24087) is supplied as a kit containing the following:

25

30

35

40

HSP Installation

45

50

55

5

10

HSP Hardware Installation

Before beginning the installation procedure, operate the system to verify that it is in working order.

15

Note: The HSP can only be installed in systems operating on software version 4.2 and up.

Perform the following to install the HSP kit in your Whisper based Response system.

20

1. Power-down the system.
2. Remove the Whisper cabinet front panel.
3. Verify that the DIP switches on the HSPI and PM2 boards are set as follows:

25

30

4. Insert the HSPA, HSPI and PM2 boards into the slots appropriate for your Whisper based Response (see Table 1.) or Micro-Response (see Table 2).

35

Note: In STARTER workstations, slot 2 must be free. If the MLT board is in slot 2, remove and insert in slot 9.

40

45

50

55

HSP Installation

5

10

5. Connect the jumper boards between the following HSP boards :

- HSPA J1 and HSPI J1
- HSPA J3 and HSPI J3
- HSPI J2 and PM2 J2

15

20

25

6. Replace the Whisper cabinet front panel.
7. Power-on the System.

30

35

40

45

HSP Installation

iii

50

55

5

HSP Software Configuration

10

In the configuration process we inform the system that the HSP boards have been installed. Perform the following from the Response application to configure the HSP boards in the system.

15

- Select **SERVICES** from the Utility menu.
- Select **CONFIGURATION** from the sub-menu.
- Select **STATION CONFIG** from this screen.
- Select **BOARD CONFIG** from this screen to display the following:

20

25

30

Toggle the HSP and PM2 fields to display YES with the Space Bar.

35

Select **SAVE & EXIT**.

Reboot the system.

40

45

iv

HSP Installation

50

55

5

HSP Testing

10

Test the HSP by performing the board tests through the on-line diagnostic handler and then test the HSP application by performing some Response operations.

15

HSP Board Diagnostics

20

Perform the following procedure to test the HSP and PM2 boards with the on-line diagnostic handler.

25

1. Invoke the diagnostic handler.
 - Select **SERVICES** from the utility menu on the Response.
 - Select **DIAGNOSTICS** from the Services Menu.

The startup screen is displayed on the terminal as shown below:

30

35

40

45

HSP Installation

50

55

5

2. Test the HSPi and HSPA boards
 - Enter U (CR) for UNIFIED
 - Enter (CR) for CHECK CONFIG.

10

The Unified subsystems that can be tested are displayed as shown in the figure below:

15

Note: Response systems have different configurations. This menu will vary depending on the configuration.

20

25

30

35

40

45

vi

HSP installation

50

55

5

- Select HSPM-2 from this menu (enter 5 (CR) to get:

10

15

20

- Enter // (CR) to run all the test in a batch.

25

3. Test the PM2 board

- Enter B to go back to the Unified subsystems menu
- Select FRAME BUFFER from this menu.
- Select PICTURE MEM from the Frame Buffer menu
- Select PM2
- Enter // (CR) to run all the tests in a batch.

30

4. Quit the Diagnostic Handler by entering Q (CR). The system exits the diagnostic mode and reboots.

35

Application Tests

Create a LW and make sure that the process ends successfully.
Rotate a CT and make sure that the process ends successfully.

40

45

50

55

5

10

15

20

active: FEP472 4 APR 90

active setups

CNF: irbrg
CLT: DISABLED
HUE: DISABLED

Edit

Load
Print
Scale
File
Offline
Shell
Quit

Pipe Image

Enable Scaling: ☒

Title:

Subtitle:

25

30

35

40

Send Image to Proofer

Job: *** Page: *** File: ***

Proofer Name Iris

Paper Size: h w

600.00 600.00

Output Size: h w

Scale Factor: h w

File Size: h w

Gradation: MTX:

NDL: ExCurve:

45

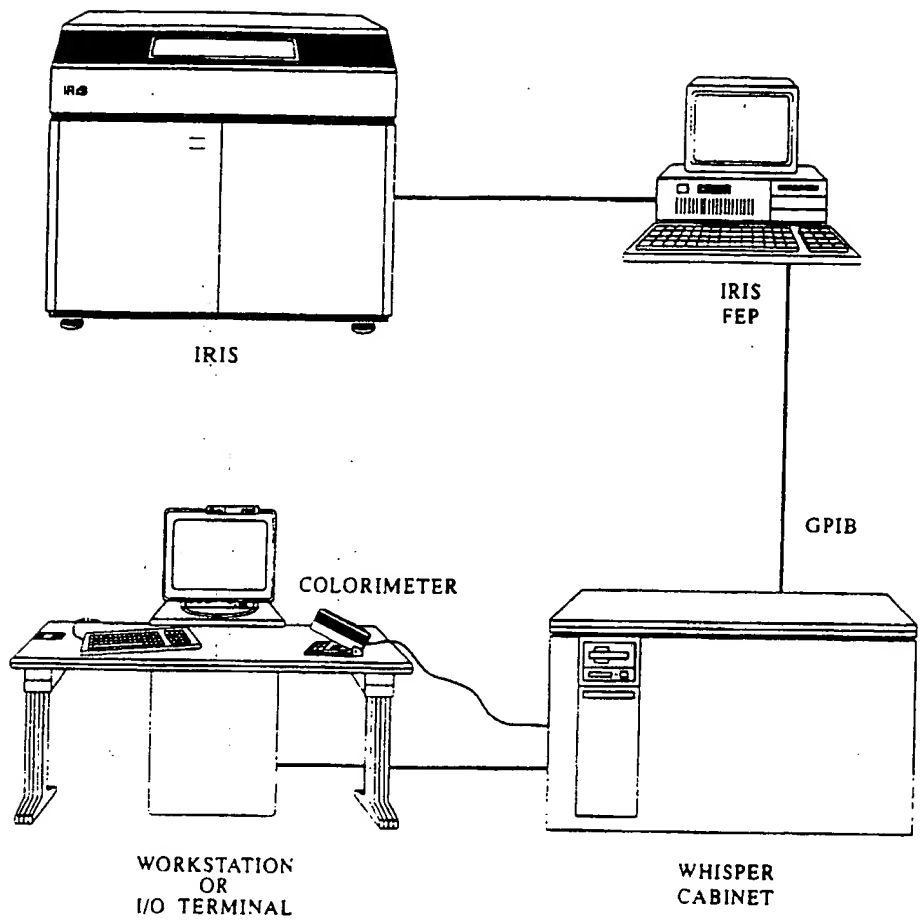
50

55

Proof

Quit

5
10
15
20
25
30
35
40
45
50
55



System Configuration	
Workstation Type	I/O
Station Name	CPU5
Network	Yes
Workstation Types: I/O, Xcelerator, Assembler, Keyline, Smartview Softproof, Rightouch, Assembler Plus, Prisma	
Save & Exit	Station Config
Storage Device	SciNet
Logical Names	MIS
Secur. Info	Quit

Security Information

Workstation Type **Assembler**

Board S/N

Password

Option	Open	Option	Open	Option	Open
Netway	~NO	USFM	~NO	DDES	~NO
HandShake	~YES	Optic	~NO	MIS	~NO
Visionary	~NO	3M	~NO	TRANS/4	~YES
Text	~YES				
Customer #	10				

**Save &
Exit**

**Main
Menu**

Quit

HandShake Configuration

Station Name **CPU5**

Save &
Exit

RS232

GP1B

MT

Main Menu

STND

Quit

5

10

15

20

25

30

35

40

45

50

55

GPIB Configuration	
GPIB Address 1:	<input type="text"/>
GPIB Address 2:	<input type="text"/>
GPIB Address 3:	<input type="text"/>
GPIB Address 4:	<input type="text"/>
Active Listen Mode:	<input checked="" type="checkbox"/> YES
Time Out (in sec):	<input type="text" value="300"/>

Save & Exit	Enter	Main Menu	Quit
-------------	-------	-----------	------

Logical Names Assignment	
Station Name	<input type="text" value="CPU5"/>

Save & Exit	Remote LogNames	HandSh LogNames	Main Menu	Quit
-------------	-----------------	-----------------	-----------	------

5

10

15

20

25

30

35

40

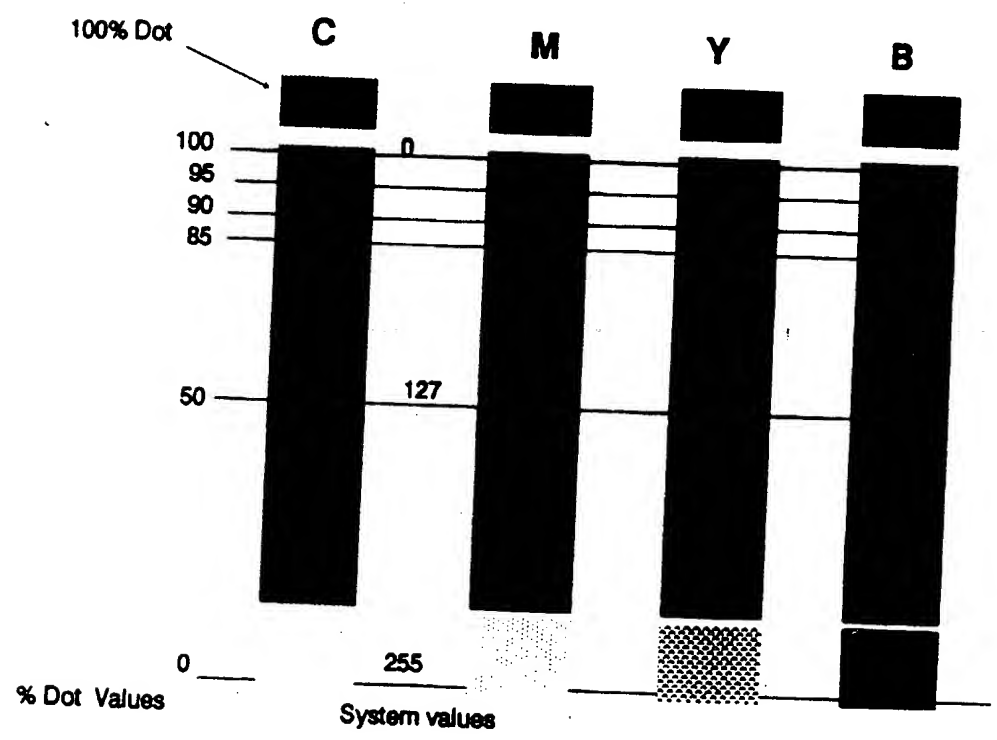
45

50

55

HandShake Logical Names		
Station Name CPU5		
Device Type	Channel Address	Logical Name
GPIB		IRIS

Save & Exit		Enter	Main Menu		Quit
-------------	--	-------	-----------	--	------



scitex FEP472 4 APR 90

VO and Files **1234** Setup

active setups

CNF: lrbg
CLT: DISABLED
HUE: DISABLED

CONTOUR

Data Type
Repeat Image
Step Image
Multi-Strike
Color Sep
COLOR BALANCE
Drum Speed
Resolution
Replication
Offsets
Mirror Image
Auto Phase
Pause Image
Tic Marks
Test Image

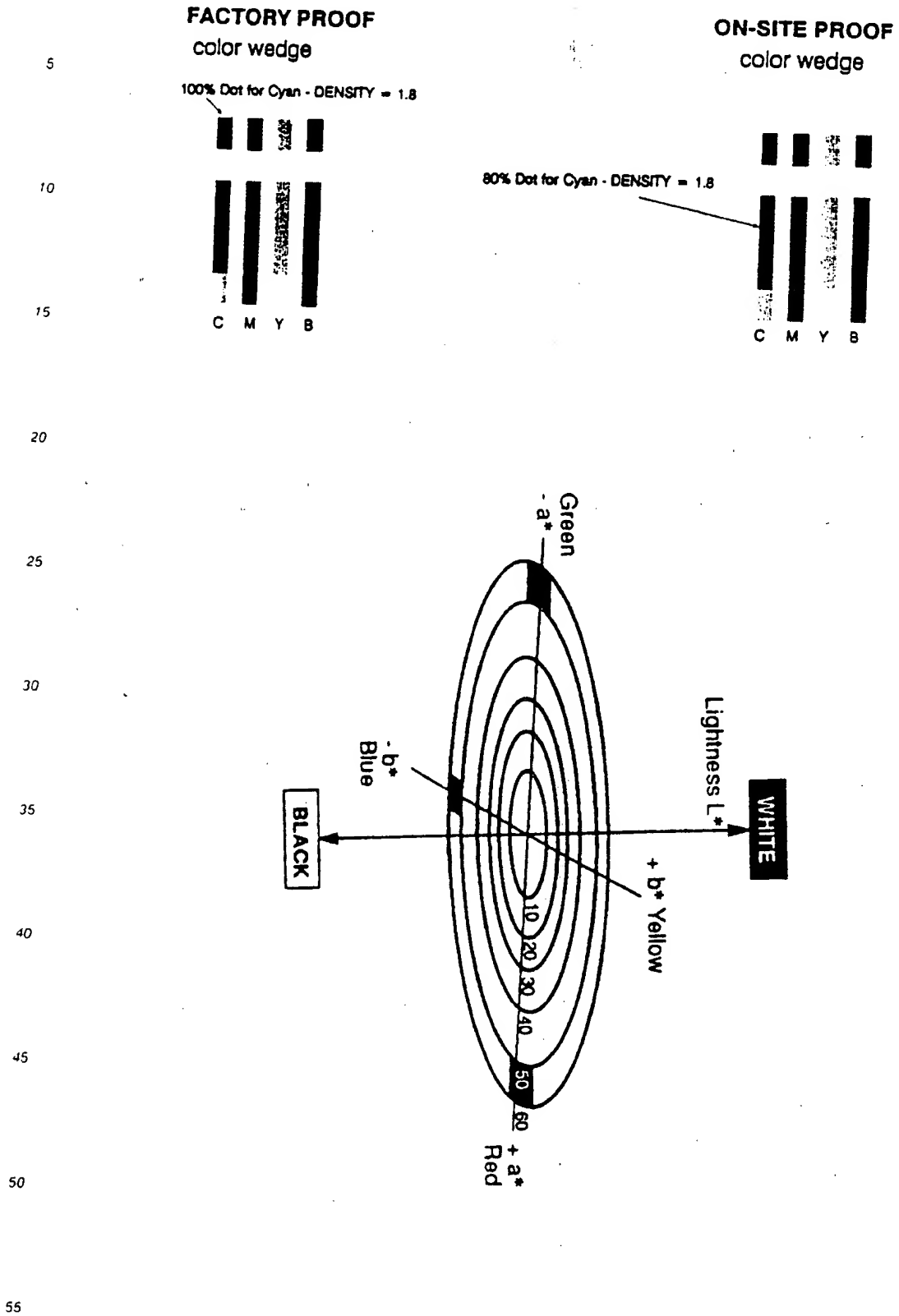
scitex FEP472 4 APR 90

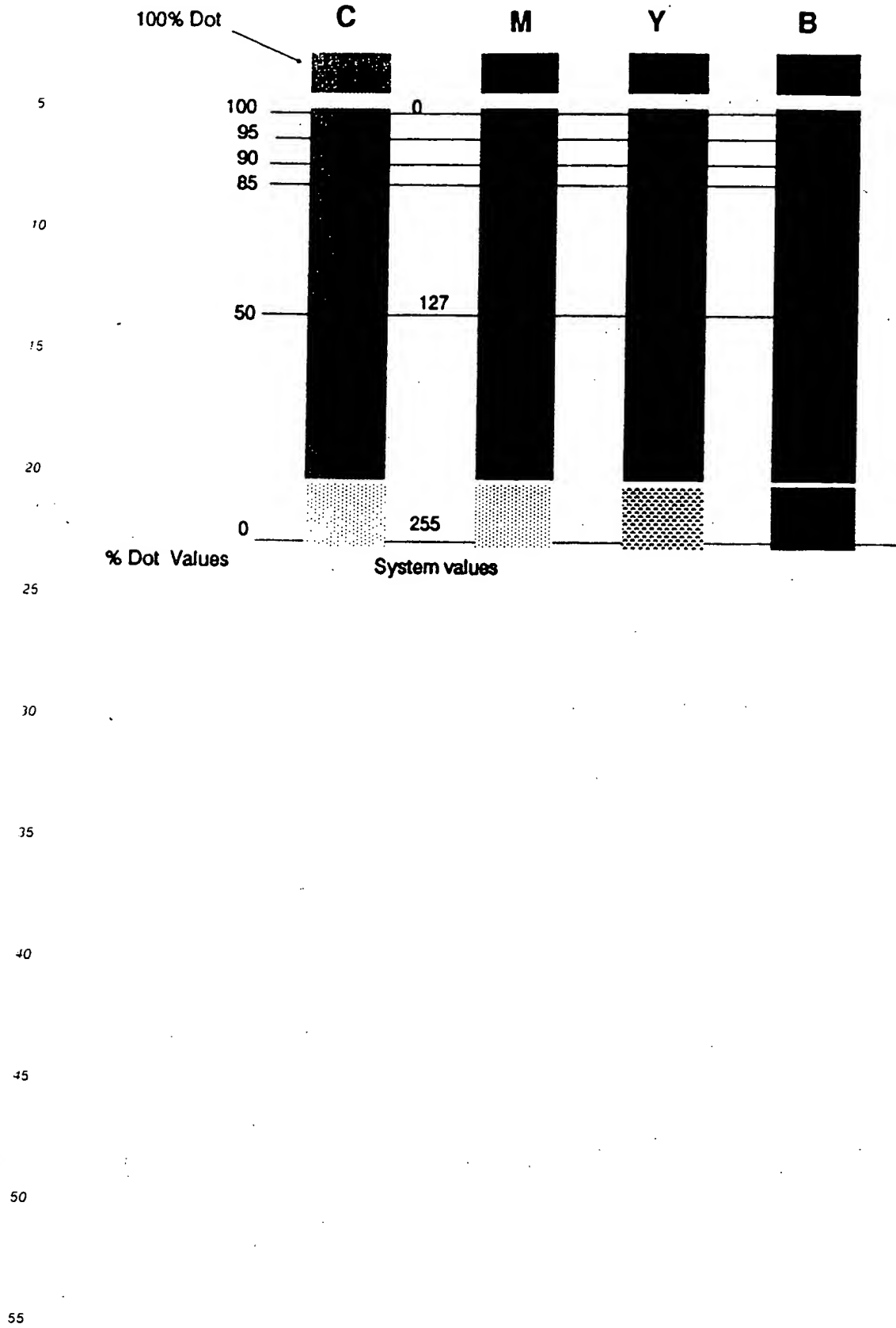
VO and Files **1234** Setup

active setups

CNF: lrbg
CLT: DISABLED
HUE: DISABLED

Cyan Density	100
Contrast	100
Magenta Density	100
Contrast	100
Yellow Density	100
Contrast	100
Black Density	100
Contrast	100





Custom Calibration

Trans/4

Measured Luminance

% Dot	CYAN	MAGENTA	YELLOW	BLACK
100 %				
95				
90				
85				
80				
75				
70				
65				
60				
55				
50				
45				
40				
35				
30				
25				
20				
15				
10				
5				
0				

3-6

Set Densities on the Iris

% Dot CYAN MAGENTA YELLOW BLACK

100 %	53.77	50.02	88.11	11.69
95	53.49	49.81	87.48	10.48
90	55.54	50.02	88.08	10.99
85	55.75	49.90	87.69	10.42
80	55.63	* 50.11	87.99	11.49
75	* 56.42	50.46	87.69	9.33
70	58.18	51.48	* 87.85	* 12.08
65				
60	60.69	53.73	88.34	17.22
55				
50	63.68	55.84	88.69	22.51
45				
40				
35				
30				
25				
20				
15				
10				
5				
0				

scitex FEP472 4 APR 80

IO and Files

Setup

active setups

CNF: lrbg
CLT: DISABLED
HUE: DISABLED

Data Type
Repeat Image
Step Image
Multi-Strike
Color Sep
Color Sep
Drum Speed
Resolution
Replication
Offsets
Mirror Image
Auto Phase
Pause Image
Tic Marks
Test Image

5

10

15

20

scitax FEP472 4 APR 90

VO and Files

Setup

active setups

CNF: lrbg

CLT: DISABLED

HUE: DISABLED

Cyan Density

Contrast

100

Magenta Density

Contrast

100

Yellow Density

Contrast

100

Black Density

Contrast

100

25

30

35

40

45

Job: ***

Page: ***

File:

Colorimeter: X-RITE 918

Receive Measures

Quit

50

55

5

10

15

20

25

30

35

40

45

50

55

Job: ***							Page: ***							File: [REDACTED]						
Proofer Measurements File Name: [REDACTED]																				
Printer Measurements File Name: [REDACTED]																				
Remark: [REDACTED]																				
Save & Exit																		Quit		

Custom Calibration

Trans/4

5

BLACK

EXCURVE DATA GATHERING

% Dot

PRINT:
Measured
LuminancePROOF:
% dot
of corresponding luminance

10

15

20

25

30

35

40

45

50

55

100 %		
95		
90		
85		
80		
75		
70		
65		
60		
55		
50		
45		
40		
35		
30		
25		
20		
15		
10		
5		
0		

3 - 14

3.2 CREATING AN OPTIMAL EXCURVE

PRINT

IRIS PROOF

5

10

15

20

25

30

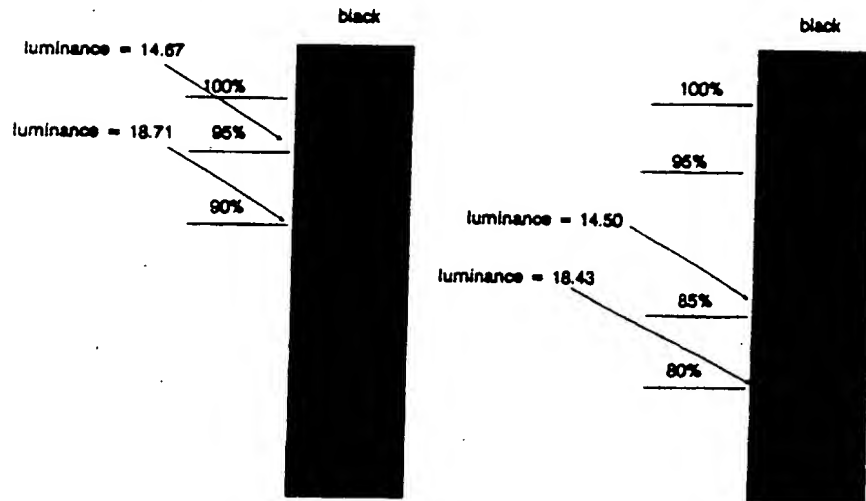
35

40

45

50

55



EXCURVE DATA GATHERING		
BLACK	PRINT:	PROOF:
% Dot	Measured Luminance	% dot of corresponding luminance
100 %	11.69	100
95	10.48	85
90	10.99	80
85		
80		
75		

CREATE FILE	
JOB:	PAGE:
FILE: xyzlut	
Modify Old File	
Scanned File	Scanner Values

Save & Exit Examine List/Modify ☐ ☐ ☐ ☐ ☐ Abort

CREATE TABLE

JOB: | PAGE: | FILE: xyzlut

Modify List of Points

On Scanned File

	C	M	Y	B
1.	100.0	100.0	100.0	100.0
2.	85.0	85.0	85.0	85.0
3.	50.0	50.0	50.0	50.0
4.	85.0	85.0	85.0	85.0
5.	80.0	80.0	80.0	80.0
6.	75.0	75.0	75.0	75.0
7.	70.0	70.0	70.0	70.0
8.	65.0	65.0	65.0	65.0

On Scanner

	C	M	Y	B
1.	85.0	85.0	85.0	14.0
2.	85.0	85.0	85.0	14.0
3.	85.0	85.0	85.0	14.0
4.	85.0	85.0	85.0	14.0
5.	85.0	85.0	85.0	14.0
6.	85.0	85.0	85.0	14.0
7.	85.0	85.0	85.0	14.0
8.	85.0	85.0	85.0	14.0

Exit

Add

Change

Deletes

Continue

CREATE TABLE

JOB: | PAGE: | FILE: xyzlut

Modify List of Points

#	On Scanned File				On Scanner			
	C	M	Y	B	C	M	Y	B
1	100	100	100	100	100	100	100	100
2	100	100	100	100	100	100	100	100
3	100	100	100	100	100	100	100	100
4	100	100	100	100	100	100	100	100
5	100	100	100	100	100	100	100	100
6	100	100	100	100	100	100	100	100
7	100	100	100	100	100	100	100	100
8	100	100	100	100	100	100	100	100

CHANGE PT. #

Cancel | Confirm Change

CREATE TABLE

JOB: | PAGE: | FILE: xyzlut

Change a Point
Point 6

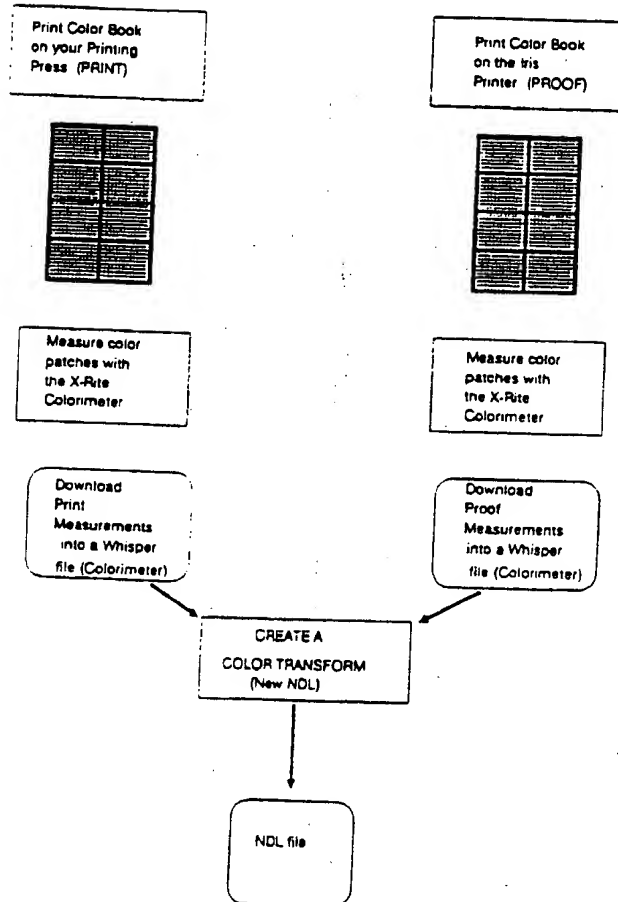
	On Scanned File				On Scanner			
	C	M	Y	B	C	M	Y	B
OLD VALUES:	100	100	100	100	100	100	100	100
NEW VALUES:	100	100	100	100	100	100	100	100

Exit | List/Modify | Another

Trans/4

Custom Calibration (optional)

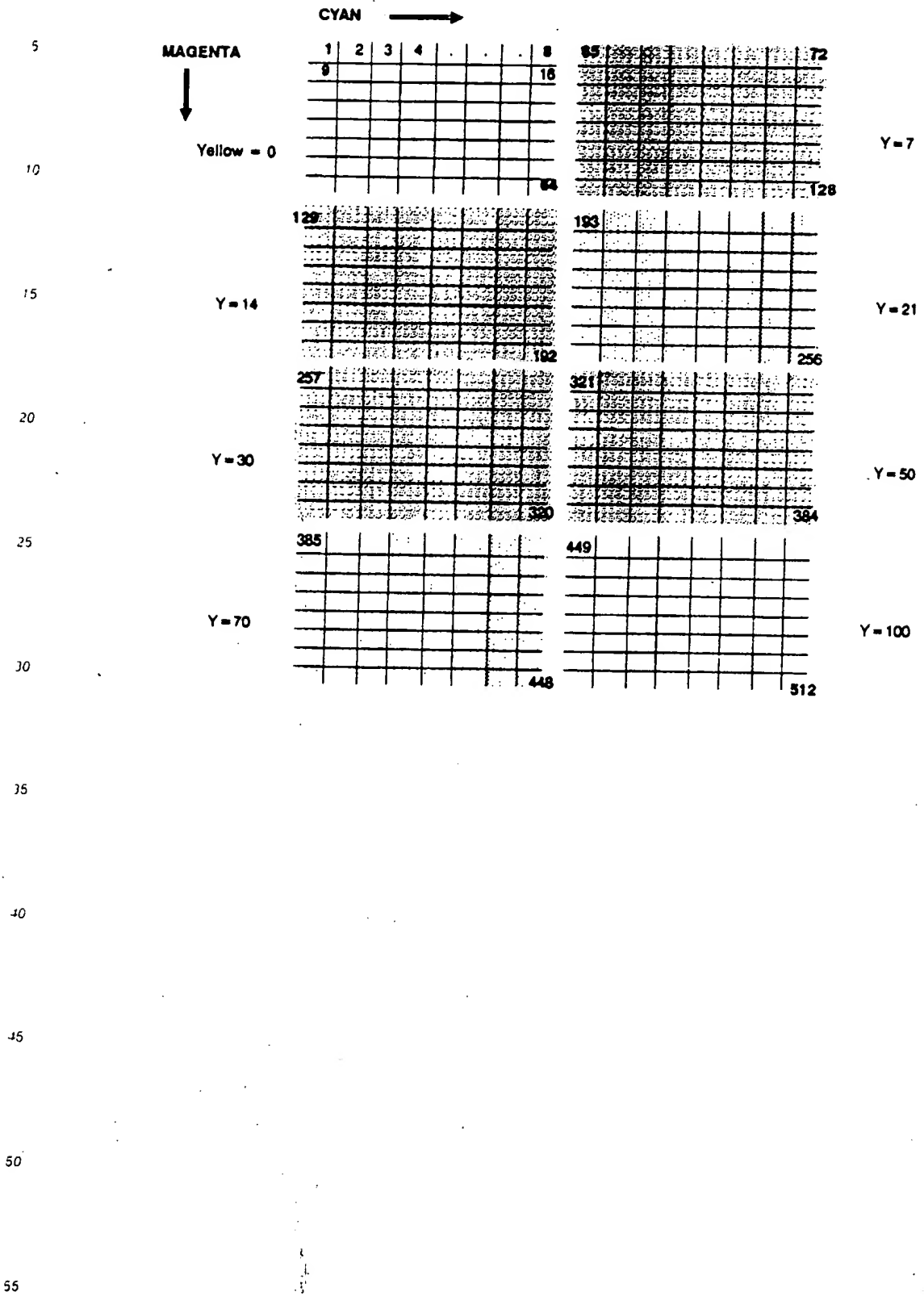
CREATING A COLOR TRANSFORM



The Color Transform

3 - 21

COLBOOK.P



$$Y = 2$$

72	80	88	96	104	112	120	128
71	79	87	95	103	111	119	127
70	78	86	94	102	110	118	126
69	77	85	93	101	109	117	125
68	76	84	92	100	108	116	124
67	75	83	91	99	107	115	123
66	74	82	90	98	106	114	122
65	73	81	89	97	105	113	121

200	206	214	222	232	240	248	256
199	207	215	223	231	239	247	255
198	206	214	222	230	238	246	254
197	205	213	221	229	237	245	253
196	204	212	220	228	236	244	252
195	203	211	219	227	235	243	251
194	202	210	218	226	234	242	250
193	201	209	217	225	233	241	249

136	144	152	160	168	176	184	192
135	143	151	159	167	175	183	191
134	142	150	158	166	174	182	190
133	141	149	157	165	173	181	189
132	140	148	156	164	172	180	188
131	139	147	155	163	171	179	187
130	138	146	154	162	170	178	186
129	137	145	153	161	169	177	185

0	16	24	32	40	48	56	64
1	15	23	31	39	47	55	63
2	14	22	30	38	46	54	62
3	13	21	29	37	45	53	61
4	12	20	28	36	44	52	60
5	11	19	27	35	43	51	59
6	10	18	26	34	42	50	58
7	9	17	25	33	41	49	57

328	336	344	352	360	368	376	384
327	335	343	351	359	367	375	383
326	334	342	350	358	366	374	382
325	333	341	349	357	365	373	381
324	332	340	348	356	364	372	380
323	331	339	347	355	363	371	379
322	330	338	346	354	362	370	378
321	329	337	345	353	361	369	377

264	272	280	288	296	304	312	320
263	271	279	287	295	303	311	319
262	270	278	286	294	302	310	318
261	269	277	285	293	301	309	317
260	268	276	284	292	300	308	316
259	267	275	283	291	299	307	315
258	266	274	282	290	298	306	314
257	265	273	281	289	297	305	313

392	400	408	416	424	432	440	448
391	399	407	415	423	431	439	447
390	398	406	414	422	430	438	446
389	397	405	413	421	429	437	445
388	396	404	412	420	428	436	444
387	395	403	411	419	427	435	443
386	394	402	410	418	426	434	442
385	393	401	409	417	425	433	441

436	484	472	480	488	496	504	512
435	483	471	479	487	495	503	511
434	482	470	478	486	494	502	510
433	481	469	477	485	493	501	509
432	480	468	476	484	492	500	508
431	459	487	475	483	491	499	507
430	458	466	474	482	490	498	506
429	457	465	473	481	489	497	505

5

10

15

20

25

30

35

40

45

50

55

Job: ***			Page:***			File: [REDACTED]		
Colorimeter: [X-RITE918]								
Receive Measures								Quit

Job: ***			Page:***			File: [REDACTED]		
Proofer Measurements File Name: [REDACTED]								
Color Transform File Name: [REDACTED]								
Printer Measurements File Name: [REDACTED]								
Remark: [REDACTED]								
Save & Exit		Analyze		Edit				Quit

5

10

15

ADD BLANK		
Job: ***	Page:***	File: [REDACTED]
New NDL : [REDACTED]		
Remark: [REDACTED]		

20

Save & Exit	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Quit
-------------	------------	------------	------------	------------	------------	------

25

30

35

40

CT < NDL		
Job: ***	Page:***	File: *****
CT File Name: [REDACTED]		
Remark: [REDACTED]		

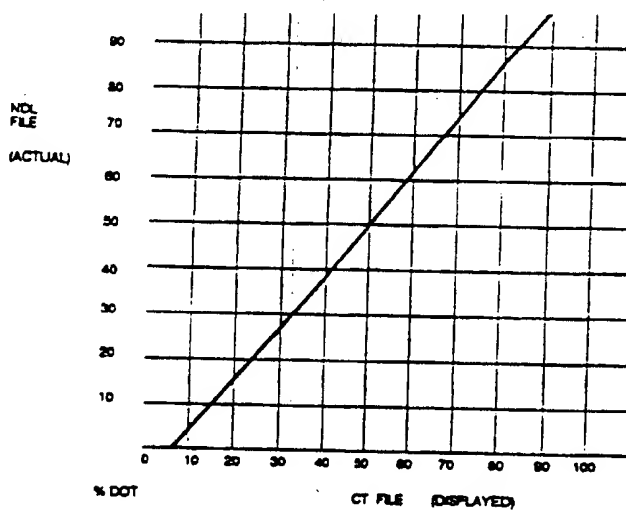
45

Save & Exit	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Quit
-------------	------------	------------	------------	------------	------------	------

50

55

101	ND	12
Job: ***	Page: ***	File: [REDACTED]
CT File Name: [REDACTED]		
Remark: [REDACTED]		
Save & Exit		Quit



Items	Quantity	Catalog No.
HSP-A	1	503D25747
HSP-I	1	503D26308
PM2 (4 Mb)	1	503D27365
Jumper	3	503B25748
Manual	1	399Z74725

HSP Installation

Board	Location	Switch Setting
HSP-I	U102	1-7: ON; 8:OFF
PM2	U1105	1:ON; 2-4: OFF

	VO, KEYLINE, ASSEMBLER, RIGHTOUCH, STARTER, SOFT/DTS	SOFT/DRUM	UNIFIED SYSTEMS ALL CONFIGURATIONS
PM2	SLOT 2	SLOT 15	SLOT 6
HSP-I	SLOT 3	SLOT 16	SLOT 5
HSPA	SLOT 4	SLOT 17	SLOT 4

Table 1. HSP Slot Assignments for Whisper based Systems

5

10

15

20

25

30

35

40

45

50

55

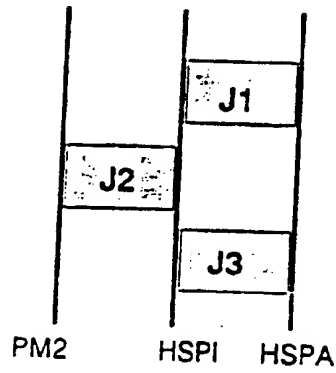


Table 2. HSP Slot Assignments for Micro-Response Systems

PM2	HSPI	HSPA
SLOT 8	SLOT 8	SLOT 7
SLOT 7	SLOT 7	SLOT 6
SLOT 6	SLOT 6	SLOT 5
SLOT 5	SLOT 5	SLOT 4
SLOT 4	SLOT 4	SLOT 3
SLOT 3	SLOT 3	SLOT 2
SLOT 2	SLOT 2	SLOT 1
SLOT 1	SLOT 1	SLOT 0
VIEWER	VIEWER	VIEWER
MICRO-ASSSEMBLER	MICRO-ASSSEMBLER	MICRO-ASSSEMBLER

Board Configuration

Functionality Enhancement

PM1

No

PM2

Yes

HSP

Yes

Save & Exit

Enter

Main Menu

Quit

5

SCITEX - DIAGNOSTICS SYSTEM (CPU X86)

VERSION X.X MONTH YEAR

Opt. Available: TT - Tutorial SC - Set config VH - Version Highlight
UT - Utilities Q - Quit

10

Dev. Available: W - WHISPER U - UNIFIED S - SMART_SCANNER
X - CSS_I C - CSS_II R - RAYSTAR
D - DOLEV I - INTERFACE

15

Your Request:

20

25

HSP Installation

v

30

35

40

45

50

55

5

10

15

20

25

30

35

40

45

50

55

vi

HSP installation

SYSTEM UTILITIES UNIFIED DIAGNOSTICS v.x MONTH-YR

?? Help CD Change Device Q Quit

F Flags S Status E Errors M Modes

Trace >

Modes > Execute

PREVIOUS SELECTION

TEST TREE

1. CPU - 386

2. PDU - conf5

3. VIDEO PROCESS

4. FRAME BUFFER

5. HSPM - 2

6. MONITOR

H: home B: back

HELP

Prompt >

SYSTEM UTILITIES UNIFIED DIAGNOSTICS v.x MONTH-YR

?? Help CD Change Device Q Quit

F Flags S Status E Errors M Modes

Trace >

Modes > Execute

PREVIOUS SELECTION

1. CPU - 386

2. PDU - conf5

3. VIDEO PROCESS

4. FRAME BUFFER

5. HSPM - 2

6. MONITOR

TEST TREE

1. WDC

2. SEQUENCER

3. WCS

4. ALPS

5. CPM

6. BARREL SHFT

7. MPY AND FR

8. SP MEM

9. MAP @ SH MEM

10. PARALLEL EXE

H: home B: back

HELP

Prompt >

APPENDIX F

```
Dump of file [YOAV B.COLOR.COMPUTER.NDAT]PAT1.OBJ;8
on 31-OCT-1990 14:53:14.78      File ID (6574,5,0)
End of file block 24 / Allocated 24
```

Virtual block number 1 (00000001), 512 (0200) bytes

10	3A34	3120	3039	3931	2D54	434F	2D31	3330
	2E31	5604	3154	4150	0402	0000	0000	0031
	3356	2043	2058	4156	0100	0010	0000	0000
	0000	0000	0000	0000	0000	0000	0000	3732
	5009	6001	0500	0900	63FC	5014	0104	0000
	43C8	FC50	0001	0402	01FA	3135	302D	312E
15	046C	6A05	AF37	BD36	866C	6A05	AF37	BD36
	866C	6A05	AF37	BDB6	86E8	5000	0004	20FF
	09A0	0105	666F	6F72	70FB	5006	0504	1B00
	0504	5009	9C01	0574	6E69	7270	FB50	0005
	0105	657A	6973	FC50	0F05	041B	0C05	0450
	09A4	0105	7878	FE50	0C05	041B	0605	0450
20	7266	FC50	1905	041B	1405	0450	09AC	0105
	7469	6E69	FC50	1405	041B	0F05	0450	09A8
	5022	0504	1B1E	0504	5009	B401	0574	6573
	FD50	1E05	041B	1905	0450	09B0	0105	6565
	0504	1B26	0504	5009	BC01	0564	6E69	FD50
	2605	041B	2205	0450	09B8	0105	6C6C	61FD
25	1B2E	0504	5009	C401	056D	6964	FD50	2E05
	041B	2A05	0450	09C0	0105	6675	62FD	502A
	0504	5009	CC01	0562	6772	FD50	3605	041B
	3205	0450	09C8	0105	7475	6FFD	5032	0504
	5009	D401	057A	7978	FD50	3E05	041B	3A05
	0450	09D0	0105	796D	63FD	503A	0504	1B36
30	7475	6FF0	5046	0504	1B45	0504	1B42	0504
	5009	D801	0578	78FE	5042	0504	1B3E	0504
	6564	6E69	2079	6D63	2026	2062	6772	F150
	5705	046E	6F69	736E	656D	6964	2074	7570
	0472	6566	6675	6220	796D	63F6	5072	0504
	7265	6666	7562	2062	6772	F650	6705	0478
	6675	6220	7A79	78F6	5000	8D05	0578	6564
35	6E69	2079	6D63	2026	2062	6772	F150	7D05

EP 0 475 554 A2

Virtual block number 2 (00000002), 512 (0200) bytes

5	4320	7475	7074	754F	F050	00A2	0505	7865
	646E	6920	7A79	78F7	5000	9805	0572	6566
	4080	C49C	4000	20C5	4100	20C5	4080	0000
	4220	EC50	0A84	0105	656C	6261	5420	594D
	2072	6566	6F6F	7270	2074	6573	2064	6E61
	2074	696E	69D9	5000	B305	0502	0200	8312
10	7461	642E	6970	7766	F750	00DB	0505	2979
	6D63	2064	6E61	2062	6772	202C	7A79	7828
	6566	6675	6220	6267	72F6	5000	F005	0572
	6566	6675	6220	7A79	78F6	5000	E505	0561
	7865	646E	6920	6267	72F7	5001	0605	0572
	6566	6675	6220	796D	63F6	5000	FB05	0572
15	207A	7978	2820	7265	746E	6972	7020	7465
	7320	646E	6120	7469	6E69	E150	0110	0505
	7562	207A	7978	F650	013A	0505	6274	6164
	2E69	7077	66F7	5001	3005	0529	796C	6E6F
	F6AD	3260	00D0	500C	BCDE	F8AD	01D0	F6AD
	00B0	5E0C	C200	0080	5018	0004	7265	6666
20	CF02	FB04	ACDD	0161	40DD	0151	08BC	DE50
	F6AD	325E	1360	9550	6041	D050	08BC	DE51
	50F8	AD01	7861	50D0	50F8	AD61	C151	0CAC
	D00C	1201	F4AD	B1F4	AD50	B050	50F7	0093
	DE51	F6AD	32F6	AD50	B050	01F6	ADA1	0450
	FFFF	FFFF	8FD0	0812	01F8	ADD1	F8AD	50D0
25	04AC	9129	132C	04AC	915E	04C2	0000	0404
	5000	8F98	A212	AE60	9550	6041	D050	08BC
	1309	04AC	910B	133F	04AC	9111	132F	04AC
	9117	133D	04AC	911D	1329	04AC	9123	1328
	1C00	0104	9E5E	10C2	0004	0404	5050	D050
	0000	0004	EC98	04AC	2090	0150	D507	1105
30	0450	01D0	0412	2AF8	BD91	FFF4	CD08	ACD0
	F2AD	FFFF	8FB0	FFFF	FFF8	ED04	ACD0	529D

35

40

45

50

55

Virtual block number 3 (00000003), 512 (0200) bytes

5	DD01 50F8 BD98 0450 50D0 50F2 AD32 0812
	F8BD 9504 5050 D050 F2AD 3208 12F4 BD95
	0960 C2F8 BD89 0150 D500 8B31 F8AD 50D0
	5001 F8AD C10F 1220 5091 FF6C CF01 FB50
	D51B 1105 1325 F4BD 910B 1325 F8BD 9111
	1350 5191 5009 60C2 8002 0200 F4BD 8951
	D050 01F8 ADC1 4811 F2AD 01B0 F4AD 50D0
10	5001 F4AD C1F8 AD50 D050 01F8 ADC1 0150
	D050 01F8 ADC1 0125 13F8 BD95 2A13 2050
	91FF 07CF 01FB 50DD 0150 F8BD 98F8 AD50
	0611 0150 D5DF 1105 13F8 BD95 0A13 2050
	91FE E7CF 01FB 50DD 0150 F8BD 98F8 AD50
	6056 5000 B0DE 5004 BCDE 5112 010C ACD1
15	5E20 C201 FC04 FF80 2531 01FF 3531 50D5
	FFFF FFFF 8FD0 0D18 FE07 CF50 7150 6056
	5000 B0DE 5004 BCDE 1F15 FE11 CF50 7150
	5250 6650 6056 5000 B0DE 5004 BCDE 5260
	5650 08BC DE54 10BC DE01 50D5 1F11 0450
	52EA AD32 EAAD 00B0 E8AD E4AD B0E4 AD00
20	B0F8 AD00 0000 008F 5004 5000 D064 5270
	F4AD 56F4 AD62 4450 5262 43D0 5204 BCDE
	53EA AD32 54E8 80AD 3201 4A1E 0CAC 52D1
	ADA1 E6AD EAAD B0F8 ADF4 AD50 0A15 F8AD
	F4AD 51F4 AD52 5052 F4AD 5208 1852 7352
	FFFF 8FD0 0818 FD6E CF52 7152 F8AD 56B7
25	1F0C AC52 D152 EAAD 32EA AD52 B052 01EA
	53E6 AD32 6462 43D0 5204 BCDE 53E6 AD32
	5404 BCDE F0AD 62D0 5204 BCDE 0450 FFFF
	4350 5208 BCDE 53E6 AD32 5408 BCDE ECAD
	6250 5208 BC85 DE62 43F0 ADD0 5204 BCDE
	00BB 3103 1F0C AC52 D152 EAAD 32EA AD01
30	B062 43EC AD50 5208 BCDE 53E6 AD32 6462

35

40

45

50

55

Virtual block number 4 (00000004), 512 (0200) bytes

5	5266 5262 5652 00B2 DE52 04BC DE50 5256
	5262 5252 6243 D052 04BC DE53 EAAD 3201
	EAAD 3254 E8AD 3201 50D5 4B1E 0CAC 52D1
	52E8 AD32 E8AD 01B0 F4AD 5250 5250 7650
	00B2 DE52 04BC DE53 E8AD 3255 F4AD 5657
	6044 5650 6342 8002 0200 D053 04BC DE52
10	D152 E8AD 32E8 AD52 B052 01E8 ADA1 6044
	5250 5257 7657 5560 5552 6452 6243 5652
	6056 5264 5262 5652 08BC DE56 F4AD 5650
	6544 5655 08AC D054 EAAD 32B8 1F0C AC52
	B0FF 4631 031E 0CAC 52D1 52EA AD32 EAAD
	52B0 5201 EAAD A165 4452 5052 5076 5056
15	A164 4352 D052 0464 43C1 5404 ACD0 53EA
	AD32 241E 0C80 AC52 D152 EAAD 32EA AD01
	0152 0CAC 01C3 52DD 0152 0810 ACC1 DC1F
	0CAC 52D1 52EA AD32 EAAD 52B0 5201 EAAD
	ADB5 E2AD 52B0 5250 F7FD BBCF 04FB 52DD
	0152 0404 ACC1 52DD 0152 0408 ACC1 52DD
20	EAAD 32EA AD01 B064 5270 5262 5652 08BC
	DE54 10BC DE04 5052 D052 E2AD 3208 13E2
	3254 6243 5652 00B2 DE52 04BC DE53 EAAD
	3256 10AC 80D0 0150 D53D 1E0C AC52 D152
	D152 EAAD 32EA AD52 B052 01EA ADA1 6652
	7052 6654 6354 6243 6452 10BC DE53 EAAD
25	0000 8F32 00A4 5270 5264 5267 5262 5652
	00B2 DE52 04BC DE54 10AC D0C6 1F0C AC52
	D008 1B0A 10AC D104 50FF FFFF FF8F D008
	1B10 AC0C ACD1 5EFE 18CE 9E00 0404 0450
	0150 D536 1E50 51D1 5010 AC10 ACC5 51FE
	1ACD 3285 FE1A CD00 B004 50FF FFFF FF8F
30	52B0 5201 FE1A CDA1 FE44 CD42 5050 5060
	4176 5004 BCDE 51FE 1ACD 3252 FE1A CD32

35

40

45

50

55

Virtual block number 5 (00000005), 512 (0200) bytes

5	32FE 1ACD FE18 CDB0 FE18 CD00 B0CD 1F52
	50D1 5210 AC10 ACC5 50FE 1ACD 32FE 1ACD
	C052 0452 C552 FE18 CD32 50FE 44CD DE51
	FE1A CD32 50D5 601E 0CAC 52D1 52FE 1ACD
	4152 5052 6240 7652 08BC DE50 FE1A CD32
	51FE 1ACD 9A02 0200 32D4 AD41 50D0 5052
10	52B0 5252 F752 10AC 52C1 5252 D052 FE18
	CD32 FE1A CD52 B052 01FE 1ACD A1FE 1CCD
	FBD4 ADDF 01FE 1CCD DF01 0CAC DD01 14AC
	DD01 A21F 0CAC 52D1 52FE 1ACD 32FE 18CD
	C2DF 0109 98C2 DF01 5280 1C00 0104 9E5E
	10C2 000C 0150 D504 0450 50D0 FC34 CF04
15	011B 11F7 AD00 9007 1350 D550 0998 C2FF
	FFFF FE8F CBFA 51CF 03FB 04AC DD01 099C
	FFFF FEFF 8FCB F7AD 0994 C290 0611 F7AD
	0190 0613 50D5 5009 98C2 FFFF FFFD 8FCB
	C240 9E50 06C4 50F7 AD9A 1113 50D5 5009
	98C2 FFFF EFFF 8FCB 6013 50D5 5009 98C2
20	C240 9E50 06C4 50F7 80AD 9A11 1350 D550
	0998 C2FF FFDF FF8F CB60 08AC B050 098A
	88C2 409E 5006 C450 F7AD 9A11 1350 D550
	0998 C2FF FFBF FF8F CB60 08AC B050 098A
	409E 5006 C450 F7AD 9A16 1350 D550 0998
	C2FF FFFB FF8F CB01 3531 6008 ACB0 5009
25	8FCB 0100 3103 1250 D550 0998 C2FF FFFD
	FF8F CB50 D501 1331 6008 ACB0 5009 8CC2
	0CEF 4A1E 0350 D180 50F6 AD9A F8AD 01D0
	F6AD 0090 6113 50D5 5009 98C2 FFFF FFF7
	9A50 03C4 50F7 AD9A 1513 50D5 50F8 AD50
30	CB50 50D2 50FF FFFF F08F CA50 0998 C214
	9AF8 AD50 D050 F8AD 0178 F6AD 5090 5001
	F6AD 8109 62C2 4108 ACB0 5150 C051 F6AD

35

40

45

50

55

Virtual block number 6 (00000006), 512 (0200) bytes

```

5      51F7 AD9A 1C13 50D5 5009 98C2 FFFF EFFF
      8FCB 0150 D500 9431 B61F 0350 D150 F6AD
      C2FF FFDF FF8F F0CB 0450 50D0 5009 70C2
      41C0 5002 50C5 5003 C450 08AC 3C51 03C4
      C240 9E50 06C4 50F7 AD9A 5108 AC3C 5303
      C453 9D02 0200 F7AD 9A2F 1350 D550 0998
10     FFFF BFFF 8FCB 0450 50D0 5009 74C2 43C0
      5002 51C5 5150 C450 603C 5060 3E50 098C
      5009 78C2 41C0 5002 50C5 5003 C450 08AC
      3C51 03C4 51F7 AD9A 1C13 50D5 5009 98C2
      9CC2 DF01 0998 C2DF 0152 801C 0001 049E
      5E0C C200 0404 0450 0000 8F32 0450 50D0
15     CB01 1B11 F9AD 0090 0713 50D5 5009 98C2
      FFFF FFEE 8FCB F859 CF03 FB04 ACDD 0109
      C2FF FFEE FF8F CBF9 AD09 94C2 9006 11F9
      AD01 9006 1350 D550 0998 C2FF FFFF FD8F
      8AC2 409E 5006 C450 F9AD 9A17 1350 D550
      0998 C2FF FFEF FF8F CB6F 1350 D550 0998
20     C450 F9AD 9A17 1350 D580 5009 98C2 FFFF
      DFFF 8FCB 0450 50D0 5060 3C50 603E 5009
      1713 50D5 5009 98C2 FFFF BFFF 8FCB 0450
      50D0 5060 3C50 603E 5009 8AC2 409E 5006
      0998 C2FF FFFB FF8F CB04 5050 D050 603C
25     5060 3E50 0988 C240 9E50 06C4 50F9 AD9A
      FFF7 8FCB 0450 50D0 5060 3C50 603E 5009
      8CC2 409E 5006 C450 F9AD 9A17 1350 D550
      F9AD 9A0E 1350 D550 A509 98C2 FFFF EFFF
      8FCB FAAD 00B0 6013 50D5 5009 98C2 FFFF
      5003 C450 F9AD 9A0E 1350 D550 0998 C2FF
30     FFDF FF8F CBFA AD09 62C2 40B0 5003 C450
      66C2 40B0 5003 C450 F9AD 9A0E 1350 D550
      0998 C2FF FFBF FF8F CBFA AD09 64C2 40B0

```

35

40

45

50

55

Virtual block number 7 (00000007), 512 (0200) bytes

	ADFF	FFFF	FF8F	D053	CC1C	0001	049E	5E1C
5	C200	0C01	0404	5050	D050	FAAD	3CFA	AD09
	52D5	5209	98C3	FFFF	FFBF	8FCB	F6F1	CF03
	FB04	ACDD	0109	9CC3	DF01	0998	C3DF	01F0
	FD8F	CB50	D522	1109	94C3	0090	0913	52D5
	8002	0200	5209	98C3	FFFF	FFFE	8FCB	3B13
	AD00	D004	50FF	FFFF	FF8F	D001	50D5	0B11
10	0994	C301	900A	1352	D552	0998	C3FF	FFFF
	D252	0998	C3FF	FFFF	F08F	CB01	A131	031F
	0252	D152	EEAD	9AF4	AD01	D0EE	AD00	90F0
	AD00	9001	015C	3104	1252	D552	0998	C3FF
	FFFF	7F8F	CB12	1252	D552	F4AD	52CB	5252
	50FF	FFFF	F08F	CA50	0998	C314	0CEF	01B4
15	4731	031F	0352	D152	EFAD	9AF8	AD01	D0EF
	8FCB	0100	FE31	0412	50D5	5009	98C3	FFFF
	FF7F	8FCB	1212	50D5	50F8	AD50	CB50	50D2
	1100	0502	0050	CF50	51D0	5150	D050	EFAD
	9A00	BF31	0312	50D5	5009	98C3	FFFF	FFEF
	B050	0988	C340	9E50	06C4	50EE	AD9A	50D5
20	2A11	50D5	3FFF	F5E6	EF17	0109	1180	500A
	03C4	51EE	AD9A	50D5	0211	6000	B050	098A
	C340	9E50	06C4	50EE	AD9A	50D5	1611	6000
	FF8F	B051	50C0	51EF	AD9A	5003	C450	EEAD
	9A16	1209	62C3	40B5	5051	C050	EFAD	9A51
25	51C0	50EF	AD9A	5103	C451	EEAD	9A52	50C0
	52EF	AD9A	5003	C450	EEAD	9A09	62C3	41FF
	C342	D509	70C3	4250	D0BF	1C43	4F4C	4C41
	4D06	0001	FB50	DD01	5009	62C3	F740	3C50
	50D5	5009	98C3	FFFF	FFDF	8FCB	50D5	2F11
	F0AD	00D0	0450	FFFF	FFFF	8FD0	0812	0970
30	B21C	4545	5246	0400	01FB	0970	C341	DD01
	5150	C051	EFAD	9A50	03C4	50EE	AD9A	1F13

35

40

45

50

55

EP 0 475 554 A2

Virtual block number 8 (00000008), 512 (0200) bytes

5	3103 1E03 50D1 50EF AD9A FBAD 50D0 50F8
	AD01 78EF AD50 9050 01EF AD81 F0AD 00D0
	FE5F 3103 1E02 52D1 52EE AD9A F4AD 52D0
	52F4 AD01 78EE AD52 9052 01EE AD81 FEB9
	DD01 FB1C 3154 5845 0400 01FB 10AC FC02
	0200 DD01 5E10 C200 0004 0450 FFF0 CDD0
	5050 D050 6140 3C51 14BC DE50 F8AD D0FF
10	F8CD 008F 98E2 1C32 5458 4504 0001 FB04
	5458 4504 0001 FB11 DD01 DEF8 AD03 F3F6
	1C33 5458 4504 0002 FBF8 ADDD 0150 DD01
	50D0 5008 A041 3C50 14AC D051 F4AD 50C1
	50F8 AD04 C5F4 AD00 D0F8 AD00 D0D5 1C34
15	CAF8 AD10 F3D3 F4AD 03F3 F01C 3554 5845
	0400 03FB F8AD DD01 F4AD DD01 50DD 0150
	F91C 0005 049E 5E38 C200 3C04 0450 0000
	8F32 F31C 3654 5845 0400 01FB 04AC DD01
	ADDD 0154 04BC DE53 F4AD D0FF F4CD 00D0
	ED1C 3731 5458 4505 0001 FB08 ACDD 0155
20	F8AD 00D0 FFF4 CD00 D0E1 F4AD 03F3 6443
	52B0 5250 F7D3 1C39 5458 4504 0001 FBF4
	1C30 3154 5845 0500 02FB F4AD DD01 F8AD
	DD01 5204 ACD0 53F8 AD50 C150 F4AD 04C5
	5250 F7B3 1C38 5458 4504 0000 FBCD F4AD
	10F3 D6F8 AD03 F308 A243 50B0 5050 F7EC
25	52DC AD3C DCAD 50B0 FB47 CF01 FB57 A5DF
	01F9 58CF 02FB 46A5 DF01 52DD 0152 523C
	F927 CF02 FB72 A5DF 0152 DD01 52DC AD3C
	ECAD 50D0 F93B CF02 FB67 A5DF 0152 DD01
	B001 50D5 00D1 3103 1950 F4AD D1E9 1C32
30	3154 5845 0500 00FB F4AD 00D0 E8AD 50D0
	FB52 DEAD 3C50 D547 1850 E0AD D1F2 1C31
	3154 5845 0500 00FB E0AD 00D0 DEAD F4AD

35

40

45

50

55

Virtual block number 9 (00000009), 512 (0200) bytes

5	FB50 DD01 50DE AD3C E0AD DD01 52E0 ADC0
	5250 C450 50D0 E91C 3131 5458 4505 0000
	4505 0000 FBEO AD50 D050 01E0 ADC1 E8BD
	4250 B050 50F7 ED1C 3331 5458 4505 0002
	ADD1 F21C 3854 5845 0400 00FB FE02 0200
	E0AD 00D0 BB19 50E0 ADD1 F61C 3131 5458
10	DD01 52E0 ADC0 5250 C450 50D0 E91C 3854
	5845 0400 00FB 52DE AD3C 50D5 4718 50E0
	01E0 ADC1 ECBD 4250 B050 50F7 ED1C 3431
	5458 4505 0002 FB50 DD01 50DE AD3C E0AD
	00FB F4AD 52D0 5201 F4AD C1BB 1950 E0AD
	D1EF 1C38 5458 4504 0000 FBEO AD50 D050
15	53DD 0153 52C0 52DC AD3C 53DE AD3C FF32
	3103 1850 F4AD D1C8 1C32 3154 5845 0500
	FBF0 AD00 D0E4 AD50 D0F8 19CF 02FB 008D
	C5DF 01F0 ADDD 01F8 27CF 02FB 7DA5 DF01
	D1E9 1C31 3154 5845 0500 00FB F8AD 00D0
	5318 50F0 ADD1 F41C 3531 5458 4505 0000
20	C1F5 1C36 3154 5845 0500 03FB E4AD DD01
	F0AD DD01 F8AD DD01 0150 D52C 1850 F8AD
	52D0 5201 F0AD C1D7 1950 F8AD D1EF 1C31
	3154 5845 0500 00FB F8AD 50D0 5001 F8AD
	A3CF 02FB 0098 C5DF 01F0 ADDD 01AD 1950
	F0AD D1DF 1C35 3154 5845 0500 00FB F0AD
25	AD02 C551 04AC 18C5 F8AD 00D0 5380 1C00
	0104 9E5E 08C2 000C 0404 5000 008F 32F7
	C562 60B0 5020 A340 9E50 51C0 50F8 AD02
	C551 08AC 18C5 5220 A340 9E50 51C0 50F8
	603E 5018 A340 9E50 51C0 50F8 AD02 C551
	08AC 18C5 5250 C052 F8AD 02C5 5004 AC18
30	A340 9E50 08AC 18C5 5128 A340 9E50 04AC
	18C5 AAF8 AD03 F360 61B0 5018 A342 9E51

35

40

45

50

55

EP 0 475 554 A2

Virtual block number 10 (0000000A), 512 (0200) bytes

	6260	B052	2CA3	419E	5062	3E52	D12C	A340
5	9E50	08AC	18C5	5104	AC18	C561	6250	5228
	C200	0C04	0000	C260	B052	2EA3	419E	5062
	3E52	2EA3	409E	5008	AC18	C551	04AC	18C5
	3250	20A2	409E	5051	C050	BB02	0200	0CAC
	02C5	5108	AC18	C552	F61C	0001	049E	5E08
	ADD5	F8AD	53D0	5350	C250	6032	5020	A240
10	9E50	51C0	500C	AC02	C551	04AC	18C5	5360
	801C	0001	049E	5E18	C200	0404	0450	50D0
	50FF	F8CD	3CF8	AD50	D050	F8AD	CE08	18F8
	AD18	C501	50D5	0153	3103	1F5C	F8AD	D15C
	14A2	3CF8	AD00	D009	E0C2	5CB0	5C62	4952
	14A2	3CF4	AD5C	D05C	01F8	ADC1	0123	3103
15	1A5C	D55C	6C3C	5C6C	3E5C	2EA2	4C9E	5CF8
	1A5C	D55C	6C3C	5C6C	3E5C	2EA2	4C9E	5CF4
	AD18	C501	50D5	010D	3103	1F5C	F4AD	D15C
	186C	6051	5C28	A24C	9E5C	F8AD	18C5	5028
	A24C	9E5C	F4AD	18C5	F0AD	00D0	00DD	3103
	3CFE	4FCF	02FB	F8AD	DD01	F4AD	DD01	FE5C
20	CF02	FB5C	DD01	5C14	A23C	F8AD	DD01	2D80
	DD01	ECAD	DD01	481E	04A2	ECAD	D1EC	AD00
	D0FE	3FCF	02FB	F4AD	DD01	5CDD	015C	14A2
	F0AD	D150	D45C	09E0	C23C	F0AD	5CD0	5CF0
	ADC0	5C50	3CFE	D7CF	03FB	F8AD	DD01	F4AD
25	04A2	ECAD	D1EC	AD5C	D05C	01EC	ADC1	50D5
	1211	0413	E8AD	D5E8	AD50	D050	D602	1B5C
	1A6C	60B1	5C2C	A24C	9E5C	F4AD	18C5	502C
	A24C	9E5C	F8AD	18C5	3B12	E8AD	D5B8	891F
	6C00	B05C	2EA2	4C9E	5CF8	AD18	C501	50D5
	1311	6C00	B05C	2EA2	4C9E	5CF4	AD18	C512
30	5CD0	5C01	F8AD	C1FE	F631	031E	5CF4	ADD1
	5C14	A23C	F4AD	5CD0	5C01	F4AD	C101	1711

Virtual block number 11 (0000000B), 512 (0200) bytes

	9E51	FE1C	0006	049E	5E08	C200	0001	50D5
5	04FE	B031	031E	5CF8	ADD1	5C14	A23C	F8AD
	22A1	4C9E	5CF8	AD24	C501	50D5	231E	5CF8
	ADD1	5C16	A03C	F8AD	00D0	50D1	1C00	0104
	0401	50D5	04E0	1F5C	EA02	0200	F8AD	D15C
	16A0	3CF8	AD5C	D05C	01F8	ADC1	6C00	B05C
10	D008	1262	D562	50D0	E61C	434F	4C4C	414D
	0600	01FB	08AC	DD01	5204	ACD0	5E04	C200
	B052	921C	0001	049E	53FE	1C00	0504	9E5E
	08C2	000C	0404	5000	D004	50FF	FFFF	FF8F
	50A4	5009	E2C2	403C	50FA	AD3C	51F8	AD3C
15	271E	0450	D150	FAAD	3CFA	AD00	B0F8	AD01
	50F8	AD3C	00A2	C3DF	01D9	1F04	50D1	50FA
	AD3C	FAAD	50B0	5001	FAAD	A1F8	AD51	B051
	D004	50FF	FFFF	FF8F	D008	1350	D5FF	71CF
	03FB	04AC	DD01	50DD	0150	0CA2	C450	02C4
20	00B0	FEFE	CD00	B053	801C	0001	049E	55FE
	1C00	0604	9E5E	FEF8	CE9E	003C	0404	5000
	FEFC	CD3C	0150	D554	1E16	A3FE	FCCD	B1FE
	FCCD	00B0	FF00	CD96	7F4C	188F	50FE	F8CD
	18FF	00CD	6251	521E	A540	9E50	24C4	50FE
	FCCD	3C2D	1362	B552	22A5	409E	5024	C450
25	5201	FEFC	CDA1	FF00	CD62	5052	1EA5	409E
	5024	C450	FEFE	CD3C	FEFE	CDFE	FCCD	B019
	50D5	411E	10A3	5280	D152	FEFC	CD3C	FEFC
	CD00	B0AF	1F16	A3FE	FCCD	B1FE	FCCD	52B0
	18C4	5262	3C52	623E	5265	429E	5250	C052
30	02C4	52FE	FCCD	3C50	24C4	50FE	FECD	3C01
	B0C2	1F10	A352	D152	FEFC	CD3C	FEFC	CD52
	B052	01FE	FCCD	A162	02B0	522E	A342	9E52
	14A3	FEFA	CDB1	FEFA	CD00	B001	50D5	008B
35	3103	1F08	A352	D152	FEFC	CD3C	FEFC	CD00

35

40

45

50

55

Virtual block number 12 (0000000C), 512 (0200) bytes

5	CDB0	341B	0150	C4D1	5060	3C50	603E	502E
	A340	9E50	18C4	50FE	FACD	3C01	50D5	621E
	02C4	50FE	FCCD	3C51	18C4	51FE	FACD	3C52
	513C	FEF8	CD50	B050	01FE	F8CD	A151	FEF8
	F152	0000	01FF	0305	01FD	FEFA	CDA1	FF08
10	CD42	5070	5060	6D50	20A3	409E	5051	C050
	3232	5F6C	6163	6F6C	08ED	1B00	0000	1800
	0600	BE0F	3154	4150	0400	0000	0700	BC0B
	0044	00BF	0633	325F	6C61	636F	6C08	ED1B
	0000	00A0	0006	00BE	0F00	0000	8800	BF06
15	00BE	1000	0000	F000	BF06	3432	5F6C	6163
	6F6C	08ED	1B00	0000	E400	0600	BE0F	0000
	04A4	0006	00BE	1000	0002	D000	BF06	325F
	325F	6C61	636F	6C09	EC1B	0000	01D4	0006
	EC1B	0000	05A8	0006	00BE	1000	0001	0100
20	BF06	315F	325F	6C61	636F	6C09	EC1B	0000
	636F	6C09	EC1B	0000	07A0	0006	00BE	1000
	0001	F800	BF06	315F	315F	6C61	636F	6C09
	315F	6C61	636F	6C09	EC1B	0000	0900	0006
	00BE	1000	0001	5F00	BF06	325F	315F	6C61
25	BF06	365F	335F	6C61	636F	6C09	EC1B	0000
	0B2C	0006	00BE	1000	0002	2C00	BF06	345F
	0002	4800	BF06	355F	335F	6C61	636F	6C09
	EC1B	0000	0BC4	0006	00BE	1000	0000	9800
	0006	00BE	0E00	0000	B400	BF06	315F	6C61
	636F	6C07	EE1B	0000	0E0C	0006	00BE	0E00
30	EE1B	0000	0F14	0006	00BE	0E00	0000	5400
	BF06	325F	6C61	636F	6C07	EE1B	0000	0EC0
	6C61	636F	6C08	ED1B	0000	1090	0006	00BE
	0F00	0001	7900	BF06	345F	6C61	636F	6C07
	00BF	0635	5F6C	6163	6F6C	07EE	1B00	0010
35	D800	0600	BE0E	0000	0045	00BF	0630	325F

Virtual block number 13 (0000000D), 512 (0200) bytes

5	BE0E 0000 0078 00BF 0636 5F6C 6163 6F6C
	07EE 1B00 0011 0000 0600 BE0E 0000 0028
	0013 AC00 0600 BE0E 0000 0233 00BF 0637
	5F6C 6163 6F6C 07EE 1B00 0011 7800 0600
	FACD 50B0 5001 8002 0200 0000 BE0E 0000
10	00E4 00BF 0638 5F6C 6163 6F6C 07EE 1B00
	3103 1E08 A352 D152 FEFC CD3C FEFC CD52
	B052 01FE FCCD A1A1 1F14 A3FE FACD B1FE
	CD52 B052 01FE F8CD A150 FEF8 CDB0 2F1E
	10A3 52D1 52FE FCCD 3CFE FCCD 00B0 FF78
	1F10 A352 D152 FEFC CD3C FEFC CD52 B052
15	01FE FCCD A1FF 08CD 4208 7052 503C FEF8
	08BC DE50 FE96 FCCD 3C54 FEFC CD3C 012E
	1E08 A352 D152 FEFC CD3C FEFC CD00 B0D1
	D31F 08A3 52D1 52FE FCCD 3CFE FCCD 52B0
	5201 FEFC CDA1 D0AD 4450 7050 6240 6D52
20	FBFF 08CD DF01 D0AD DF01 10A3 DD01 10A3
	DD01 04AC DD01 D0AD 4208 7052 FEFC CD3C
	7C01 0404 5000 008F 3204 50FF FFFF FF8F
	D008 13FF 04CD D5FF 04CD 50D0 F113 CF05
	B001 50D5 00C1 3103 1F0C A352 D152 F6AD
25	3CF6 AD00 B053 801C 0001 049E 5E10 C200
	409E 5018 C450 F4AD 3C01 6D1E 14A3 F4AD
	B1F4 AD00 B0F8 AD00 0000 008F 50F2 AD00
	3CF2 AD50 B050 01F2 ADA1 51F2 ADB0 55F8
	AD56 451B 0150 D150 603C 5060 3E50 2EA3
30	3C50 603E 5018 A340 9E50 51C0 5002 C450
	F6AD 3C51 18C4 51F4 AD3C 5408 BCDE 5251
	F4AD B1F4 AD50 B050 01F4 ADA1 F8AD 5050
	5055 7655 50A1 6050 6442 6450 506E 5060
	0060 50F8 AD56 5404 BCDE 52F6 AD3C F8AD
35	5050 50F8 AD08 4309 18F8 AD53 941F 14A3

40

45

50

55

Virtual block number 14 (0000000E), 512 (0200) bytes

5	8F98	FF42	3103	1E0C	A350	D150	F6AD	3CF6
	AD50	B050	01F6	ADA1	6442	50B0	5050	6950
	016F	1E0C	A3F8	ADD1	F8AD	00D0	F4AD	00D0
	53D7	1C00	0104	9E5E	10C2	001C	0404	5000
	50F8	AD50	9E02	0200	C150	04C4	5061	4098
10	510C	BCDE	50F8	ADD0	5404	BCDE	52F8	ADD0
	C250	6140	3C51	08BC	DE50	F8AD	D052	6140
	3C51	04BC	DE50	F8AD	D064	4209	EAC3	40B0
	50D0	50F0	ADF4	ADC1	010B	11F4	AD50	D050
	F4AD	F0AD	C30D	18F0	ADD5	F0AD	52D0	5250
15	0104	9E5E	10C2	001C	0404	50F4	ADD0	921F
	0CA3	F8AD	D1F8	AD50	D050	01F8	ADC1	F4AD
	50F8	ADD0	5304	BCDE	52F8	ADD0	0163	1E0C
	A4F8	ADD1	F8AD	00D0	F4AD	00D0	5481	1C00
	6140	3C51	08BC	DE50	F8AD	D052	6140	3C51
20	04BC	DE50	F8AD	D063	4261	40B0	510C	BCDE
	ADF4	ADC1	0150	D50D	11F4	AD50	D050	F4AD
	F0AD	C30F	18F0	ADD5	F0AD	52D0	5250	C250
	10C2	007C	0404	50F4	ADD0	9E1F	0CA4	F8AD
	D1F8	AD50	D050	01F8	ADC1	F4AD	50D0	50F0
25	0150	D53F	1E03	50D1	50F2	AD3C	F2AD	00B0
	F4AD	0000	0000	8F50	5480	1C00	0104	9E5E
	5250	6450	0A88	C440	5650	F2AD	3C52	506E
	5060	413C	5004	BCDE	51F2	AD3C	55F4	AD56
	5204	ACD0	C41F	0350	D150	F2AD	3CF2	AD50
30	B050	01F2	ADA1	F4AD	5050	5055	7655	5260
	F4AD	5655	F8AD	56F8	AD50	5050	5576	5552
	6452	0A94	C456	5550	6E50	603C	5006	A23E
	5616	1852	7352	F4AD	56F4	AD50	5050	5576
	5552	6452	0A84	C456	B955	5262	5214	6652
35	3C50	5269	5200	6252	F4AD	5601	50D5	1411
	0450	50D0	5050	3C50	5269	5200	6052	F4AD

Virtual block number 15 (0000000F), 512 (0200) bytes

```

AD00 B0EC AD00 0000 008F 5056 BA1C 0001
049E 5E1C C200 7C50 D504 0450 50D0 5050
6041 3C50 10BC DE51 E6AD 3C53 04BC DE52
E6AD 3C50 D530 1E04 A652 D152 E6AD 3CE6
D1D2 8002 0200 1F04 A650 D150 E6AD 3CE6
AD50 B050 01E6 ADA1 6342 50B0 5050 F750
E6AD 00B0 06A3 52B0 5252 F752 503C FECF
CF01 FB0C ACDD 0153 04AC D017 1B03 08A6
08BC DE51 E6AD 3C52 6041 3250 04BC DE51
E6AD 3C01 50D5 5D1E 08A6 52D1 52E6 AD3C
5654 ECAD 56E8 AD50 5050 5276 5250 6650
6656 5250 5650 524E 5250 C250 6041 3250
ADBB 3CE6 AD50 B050 01E6 ADA1 ECAD 5050
5054 7654 5260 5250 6450 E8AD 5652 E8AD
0050 808F F0AD 6111 18F0 AD73 F0AD 5270
5208 A66E 54EC AD56 A61F 08A6 50D1 50E6
001C 0404 50FF FFFF ECED 50EC AD52 5052
5476 54F0 AD66 F0AD 5270 5200 0000 0000
1819 520C AC71 5262 5652 28A4 429E 5218
C452 0A98 C43C 5480 1C00 0104 9E5E 08C2
5218 C452 0A98 C43C 0401 1B52 D552 623C
5262 3E52 2EA4 429E 5218 C452 0A98 C43C
AD00 B062 14AC B052 2CA4 429E 5218 C452
0A98 C43C 6352 5052 0CAC 7653 28A4 429E
5051 C050 02C4 50FA AD3C 5118 C451 0A98
C43C 0150 D539 1E08 A452 D152 FAAD 3CFA
D150 FAAD 3CFA AD50 B050 01FA ADA1 6260
41B0 5004 BCDE 8051 FAAD 3C52 20A4 409E
C453 FAAD 3C50 18C4 500A 98C4 3C36 1E0C
A452 D152 FAAD 3CFA AD00 B0CA 1F08 A450
3CFA AD50 B050 01FA ADA1 6062 41B0 5018
A443 9E52 08BC DE51 FAAD 3C53 50C0 5302

```

Virtual block number 16 (00000010), 512 (0200) bytes

```

5  FAAD B1FA AD00 B062 01B0 522E A442 9E52
   18C4 520A 98C4 3CCA 1F0C A450 D150 FAAD
   B009 1250 00D1 5060 3C50 603E 502E A440
   9E50 18C4 50CF FAAD 3C01 50D5 571E 14A4
10 D402 0200 5018 C450 FAAD 3C52 28A4 409E
   5018 C450 0A98 C43C 0135 110A 98C4 FAAD
   AC1F 14A4 FAAD B1FA AD50 B050 01FA ADA1
   0A98 C4FA ADB0 0618 6062 5150 28A4 409E
   031F 10A4 04AC D154 801C 0001 049E 56FE
   1C00 0604 9E5E FEB8 CE9E 007C 50D5 0404
15 5201 C052 6243 3C52 0CBC DE53 04AC 01C3
   1813 04AC D550 0CBC DE55 04AC D001 0531
   3C53 6342 3C53 0CBC DE52 04AC D060 45FE
   C2CD B0FE C2CD 00F7 0106 11FE C2CD 52F7
   5060 423C 500C BCDE 5204 ACD0 0100 B131
20 031B 5253 D152 04AC C052 10A4 C252 14A4
   500C BCDE 5204 AC80 D0FE DCCD 5050 5050
   7650 10AC 6050 6256 5228 A440 9E50 18C4
   1862 FEDC CD51 5218 BCDE 381B 50D5 5060
   3C50 623E 522E A440 9E50 18C4 5060 423C
25 CF06 FB52 DD01 5201 04AC C108 ACDD 010C
   ACDD 017E 5070 50FE DCCD 5618 ACDD 012D
   0163 42A1 FEB8 CD04 ACD0 5204 ACD0 530C
   ACD0 0450 FFFF FFFF 8FD0 0813 50D5 FF23
   53D1 5204 ACC0 8052 10A4 C252 14A4 3C53
30 6042 3C50 0CBC DE52 04AC D063 4250 B050
   D57B 1E08 A452 D152 FEC0 CD3C FEC0 CD00
   B0FE BCCD 00B0 0103 4431 FF50 3103 1A52
   CD50 B050 01FE BCCD A151 FEBC C200 521E
   10A4 50D1 50FE BECD 3CFE BECD 0100 0150
35 5051 C050 02C4 50FE C0CD 3C51 18C4 5161
   403C 510C BCDE 50FE BECD 3C52 510C FEBC

```

Virtual block number 17 (00000011), 512 (0200) bytes

```

5      D150 FEBE CDBD 3CFE BECD 50B0 5001 FEBE
      CDA1 FEE0 CD42 5070 5060 6D50 20A4 409E
      FEBE CD00 B088 1F08 A450 D150 FEC0 CD3C
      FEC0 CD50 B050 01FE C0CD A1AE 1F10 A450
      0200 5252 3CFE BCCD 50B0 5001 FEBE CDA1
10     52FE BCCD B02F 1E10 A452 D152 FEBE CD3C
      00B0 D11F 10A4 50D1 50FE BECD 3CFE BECD
      50B0 5001 FEBE CDA1 FEE0 CD42 0870 8002
      6240 6D52 08BC DE50 FEC0 CD3C 53FE C0CD
      3C01 2E1E 08A4 52D1 52FE C0CD 3CFE C0CD
      FEC0 CD3C D31F 08A4 50D1 50FE C0CD 3CFE
15     C0CD 50B0 5001 FEC0 CDA1 A8AD 4350 7050
      E96F CF05 FBFE E0CD DF01 A8AD DF01 10A4
      DD01 10A4 DD01 D0AD DF01 A8AD 4208 7052
      CD00 0000 008F 50FE CCCD 01D0 FED0 CD00
      D002 0431 0313 FED8 CDD5 FED8 CD80 50D0
20     013D 13FE CCCD D543 1E52 FED4 CDD1 5216
      A43C FED4 CD00 D0FE C4CD 0A7C C450 FEC8
      01FE D4CD C1FE CCCD 00D0 FED0 CDFE D4CD
      D00C 1262 B552 22A6 409E 50FE D4CD 24C5
      FECC CDD5 0150 D5C7 1105 13FE CCCD D50B
25     1E52 FED4 CDD1 5216 A43C FED4 CD50 D050
      521E A640 9E50 FED4 CD24 C550 D541 1E52
      FED4 CDD1 5216 A43C FED4 CD00 80D0 5113
      CDC1 FEC8 CD62 5052 1EA6 409E 50FE D0CD
      24C5 FED0 CDFE D4CD D017 15FE C8CD 6251
      52D1 52FE BECD 3CFE BECD 00B0 C11F 52FE
30     D4CD D152 16A4 3CFE D4CD 50D0 5001 FED4
      7650 D0AD 4262 52FE BECD 3C50 FEC4 CD56
      1718 D0AD 4273 52FE BECD 3C01 391E 10A4
      00B0 C81F 10A4 50D1 50FE BECD 3CFE BECD
      50B0 5001 FEBE CDA1 FEC4 CD85 5050 5050
35
40
45
50
55

```

Virtual block number 18 (00000012), 512 (0200) bytes

5	50FE	C4CD	5652	FEC4	CD56	0133	1852	5071
	520A	80C4	5650	526E	52FE	BECD	3CFE	BECD
	C456	5250	6E50	FEFE	CD3C	FEFE	CD50	B050
	01FE	BECD	A1FE	C4CD	5050	5052	7652	5064
	FEC8	CDFE	C4CD	51FE	C4CD	5250	5252	7652
	10AC	6452	FEC4	CD56	CE19	5052	7150	0A80
10	FEC8	CD56	5518	BCDE	1713	FECC	CDD5	0150
	D500	8A31	0613	FECC	CDD5	0C19	8002	01F5
	C562	FEC4	CD50	521E	A642	9E52	FED0	CD24
	C565	5250	5250	7650	5266	520A	7CC4	5650
	24C5	013C	1E10	A452	D152	FEFE	CD3C	FEFE
15	CD00	B062	01B0	5222	A642	9E52	FED0	CD24
	B052	6641	9E50	0CBC	DE53	FEFE	CD3C	5152
	C052	02C4	52FE	BECD	3C51	50D0	50FE	D0CD
	0404	0450	00D0	C51F	10A4	50D1	50FE	BECD
	3CFE	BECD	50B0	5001	FEFE	CDE0	A162	6043
20	F4AD	C450	09E2	C240	3C50	F8AD	D0F8	AD03
	D0F4	AD00	D052	BF1C	0001	049E	5E0C	C200
	F4AD	D0D6	F8AD	F4F4	AD50	D050	F4AD	C050
	6140	9A51	04BC	DE50	F8AD	D0F4	AD50	D050
	0001	049E	54FE	1C00	0504	9EFF	1C4E	4941
25	4D24	4306	0016	5EFF	38CE	9E00	1C04	0450
	DF01	00DB	C4DF	0104	50FF	FFFF	FF8F	D008
	1350	D5EB	4BCF	01FB	00B3	C4DF	0153	DD1C
	50D5	EDE3	CF02	FB09	E2C3	9F01	0A9A	C3DF
	0180	1C59	5043	5254	5306	0002	FB0A	9AC3
30	0100	DD01	FF44	CD50	D0E7	AECF	02FB	00E5
	C4DF	0100	DD01	0450	FFFF	FFFF	8FD0	0813
	FF4C	CD50	D0E7	8ACF	02FB	00FB	C4DF	0100
	DD01	FF48	CD50	D0E7	9CCF	02FB	00F0	C4DF
	6203	D052	0CA3	9E01	50D5	0A11	6204	D052
35	0CA3	9E0C	1B01	52D1	5262	3C52	09E8	C33E

Virtual block number 19 (00000013), 512 (0200) bytes

5	06C4 DF01 625C D052 10A3 9E5C 0108 A3C1
	B962 6CD0 5208 A39E 5C0C A3DE 04A3 03D0
	D5EA 7FCF 01FB 0110 C4DF 0162 5CB0 52FF
	50CD 9E5C 04A3 A45C 503C E938 CF01 FB01
	5254 5306 0002 0200 9102 FB0A 9AC3 DF01
	0130 C4DF 0104 50FF FFFF FF8F D008 1350
10	0450 FFFF FFFF 8FD0 0813 50D5 ED17 CF02
	FB09 E2C3 9F01 0A9A C3DF 01C7 1C59 5043
	0600 02FB 0AFD C3DF 010A 9AC3 DF01 FF52
	CD50 D0E6 E2CF 02FB 013A C4DF 0100 DD01
	FFFF FFFF 8FD0 0813 50D5 F216 CF02 FBFF
15	56CD 9F01 CCAD DF01 801C 5950 4352 5453
	5431 031F 09E8 C352 B152 52F7 52FF 63CD
	9AFF 63CD 0090 6200 B052 FF5A CD9E 0450
	61CD 0090 0105 1D31 031F 09E6 C352 B152
	52F7 52FF 62CD 9AFF 62CD 0090 0150 D505
20	52F7 52FF 60CD 9AFF 60CD 0090 0104 E831
	031F 09E4 C352 B152 52F7 52FF 61CD 9AFF
	C052 0250 C550 04A3 C4FD E2CF 01FB FF60
	CDDF 0101 04B3 3180 031F 09E2 C352 B152
	A2AD 3C51 A2AD 3C01 50D5 361E 0CA3 5CD1
25	5CA2 AD3C A2AD 00B0 C4AD 52D0 52FF 52CD
	5CB0 5C01 A2AD A1AC AD41 09EA C34C B05C
	50C0 5CA2 AD3C 5004 C450 FF60 CD4C 9A5C
	A2AD 3C01 50D5 2B1E 04A3 5CD1 5CA2 AD3C
	A2AD 00B0 CD1F 0CA3 5CD1 5CA2 AD3C A2AD
	5CA2 AD3C A2AD 5CB0 5C01 A2AD A1A4 AD40
30	5CB0 5C5C F75C 80C4 BD4C 3C5C A2AD 3C50
	B0AA AD5C B05C 5CF7 5C50 3CF5 9DCF 01FB
	ACAD DF01 131B 0308 A3D1 D81F 04A3 5CD1
	00B0 5C2E A34C 9E5C 18C4 5CA0 AD3C 0150
35	D522 1E14 A3A0 ADB1 A0AD 00B0 0A98 C300

35

40

45

50

55

Virtual block number 20 (00000014), 512 (0200) bytes

5	F75C	FF5F	CD9A	FF5F	CD00	909A	AD00	B0E1
	1F14	A3A0	ADB1	A0AD	5CB0	5C01	A0AD	A16C
	E6C3	5CB1	5C5C	F75C	FF5E	CD9A	FF5E	CD00
	9050	D501	35D1	3103	1F09	E8C3	5CB1	5C5C
	3103	8002	0200	1F09	E4C3	5CB1	5C5C	F75C
	FF5D	CD9A	FF5D	CD00	9001	00FF	3103	1F09
10	FF5C	CDDF	0101	0095	3103	1F09	E2C3	5CB1
	5C5C	F75C	FF5C	CD9A	FF5C	CD00	9001	00CA
	1E00	0002	588F	5CD1	5C98	AD3C	98AD	5CB0
	5C50	F7F3	D6CF	03FB	90AD	DF01	ACAD	DF01
	FB88	ADDF	01A4	ADDF	0190	ADDF	015C	DD01
15	5CFF	44CD	C05C	02C4	5C5C	D05C	9AAD	3C42
	FB80	88AD	DF01	90AD	DF01	7E50	7050	C0AD
	565C	DD01	5C98	AD3C	C0AD	5050	F57F	CF04
	CD9A	9AAD	5CB0	5C5C	F75C	035C	C15C	9AAD
	3CFF	5CCD	5C90	5C01	FF5C	CD81	F670	CF05
20	5CFF	5DCD	9AFF	5DCD	5C90	5C01	FF5D	CD81
	FF6C	3103	1E09	E2C3	5CB1	5C5C	F75C	FF5C
	5C5C	F75C	FF5E	CD9A	FF5E	CD5C	905C	01FF
	5ECD	81FF	3731	031E	09E4	C35C	B15C	5CF7
	805C	B15C	5CF7	5CFF	5FCD	9AFF	5FCD	5C90
25	5C01	FF5F	CD81	FF02	3103	1E09	E6C3	5CB1
	3103	1FFF	50CD	9EAD	B19E	AD5C	B05C	5CF7
	5C9C	AD3C	9CAD	00B0	FECD	3103	1E09	E8C3
	FF7E	CDDF	01AC	ADDF	015C	DD01	5CFF	4CCD
	C05C	02C4	5C5C	D05C	9CAD	3C01	50D5	00A8
30	5C5C	D05C	9EAD	3C46	1E00	0002	588F	5CD1
	5C86	AD3C	86AD	5CB0	5C50	F7F3	50CF	03FB
	5050	F467	CF04	FBFF	76CD	DF01	A4AD	DF01
	FF7E	CDDF	015C	DD01	5CFF	48CD	C05C	02C4
	F556	CF05	FBFF	76CD	DF01	FF7E	CDDF	017E
35	5070	50BC	AD56	5CDD	015C	86AD	3CBC	AD85

Virtual block number 21 (00000015), 512 (0200) bytes

5	9CAD 5CB0 5C5C F75C 0CA3 5CC1 5C9C AD3C
	9EAD 5CB0 5C5C F75C 04A3 5CC1 5C9E AD3C
	74CD B1FF 74CD 00B0 C8AD FFFF FFFF 8FD0
	ECBA CF00 FBFF 5B31 031E FF50 CD9E ADB1
	8002 0200 1B5C D55C 6C3C 5C6C 3E5C 2EA3
	4C9E 5C18 C45C FF74 CD3C 017F 1E14 A3FF
10	CD3C 0150 D53A 114F 1107 1500 003F 808F
	6C51 5C28 A34C 9E5C 18C4 5CFF 74CD 3C54
	1511 0419 C8AD D509 1FFF 72CD FF70 CDB1
	FF70 CD6C B05C 2CA3 4C9E 5C18 C45C FF74
	FF74 CD5C B05C 01FF 74CD A1C8 AD5C D05C
15	5CD0 5CFF 74CD 3CFF 72CD FF70 CDB0 50D5
	CD3C 0154 1E0C A35C D15C FF6E CD3C FF6E
	CD00 B069 19C8 ADD5 821F 14A3 FF74 CDB1
	3C50 5CD0 5CC8 AD18 C552 FF56 CDC0 5202
	C452 5CD0 5C6C 3C5C FF5A CD3E 51FF 6E80
20	FF6E CDA1 6241 5CB0 5C5C F75C 6C3C 5C6C
	3E5C 18A3 409E 505C C05C 02C4 5CFF 6ECD
	50B8 AD00 0000 008F 5050 D500 8331 AD1F
	0CA3 5CD1 5CFF 6ECD 3CFF 6ECD 5CB0 5C01
	A4AD DF01 FF64 CDDF 017E 5070 50B8 AD56
	B4AD DF01 ED1F CF00 FBB4 AD96 7F4C 188F
25	CF02 FBD0 ADDF 01A4 ADDF 0104 50FF FFFF
	FF8F D008 1350 D5F5 53CF 06FB 00DD 8001
	5202 C452 5CD0 5C6C 3C5C FF5A CD3E D0AD
	DF01 0450 FFFF FFFF 8FD0 0813 50D5 EDD2
30	6C3C 5CFF 5ACD 3E04 50FF FFFF FF8F D008
	1350 D5EF DBCF 02FB 52DD 0152 FF56 CDC0
	FF60 CD9A FF60 CD5C 905C 01FF 60CD 8162
	5CB0 52FF 5ACD 9E5C 5CF7 5C0C A35C C15C
	F752 FF61 CD9A FF61 CD52 9052 01FF 61CD
35	81FB 4E31 031E 09E2 C35C B15C 5C85 F75C

Virtual block number 22 (00000016), 512 (0200) bytes

	B152	52F7	52FF	62CD	9AFF	62CD	5290	5201
5	FF62	CD81	FB19	3103	1E09	E4C3	52B1	5252
	E8C3	52B1	5252	F752	FF63	CD9A	FF63	CD52
	9052	01FF	63CD	81FA	E431	031E	09E6	C352
	0200	FBFF	56CD	DD01	CCAD	DD01	0AFD	C3DF
	010C	A3DD	0109	E2C3	9F01	FAAF	3103	1E09
10	0015	2000	0600	BE0F	0000	0090	00BF	0639
	5F6C	6163	6F6C	07EE	1B00	0014	9000	0605
	6C08	ED1B	0000	15A4	0006	00BE	0F00	0000
	8400	BF06	3031	5F6C	6163	6F6C	08ED	1B00
	5F6C	6163	6F6C	08ED	1B00	0016	7000	0600
15	BE0F	0000	00CA	00BF	0632	315F	6C61	636F
	00BF	0635	315F	6C61	636F	6C08	ED1B	0000
	1780	0006	00BE	0F00	0001	1000	BF06	3331
	0F00	0004	6C00	BF06	3631	5F6C	6163	6F6C
	08ED	1B00	0018	E000	0600	BE0F	0000	015E
20	9000	0600	BE0B	0000	0044	00BF	0639	315F
	6C61	636F	6C08	ED1B	0000	1D4C	0006	00BE
	FB80	1B00	0000	1800	0610	0171	09B9	0900
	0007	0A00	BF06	6E69	616D	04EE	1B00	001D
	FAFA	0000	F8F4	0402	FF02	02F5	CDFB	0302
25	FF02	02FB	E7F2	F7EE	E400	E1FB	0502	00B9
	0602	FF02	02FD	FC00	FCBC	0004	02FE	00FC
	EE00	DC00	0102	FDFD	F700	EFF3	F3F6	0000
	0102	ED01	0200	F601	0200	0102	F9F0	EB00
	0102	F1F7	F800	0102	FCDF	0102	D400	FAFB
	8002	FF02	02FA	E901	02B5	F2C7	0102	CE01
30	02EA	0102	DCA7	D900	0102	EEDB	0102	DBED
	E1E1	E100	F2F8	0102	EBEE	ED01	02F4	0402
	FC28	02E6	D5E8	E500	E7B5	F201	02F1	F906
	F2F8	0102	EBEE	ED01	02F4	0402	FFFA	0000
	D6C3	D600	FAE5	D1EF	0002	02F2	00EA	DE00

Virtual block number 23 (00000017), 512 (0200) bytes

5	EC00 FCF3 E9ED 00F2 ED01 02F8 0102 F405
	02FE 00F8 E4E4 E4FC 00F2 DB00 DBDB DB00
	02FF B9FC 0302 DCE2 0000 FCE5 00EE 00FC
	F8C7 D500 EC00 ECFE DF00 EF00 D4EC 00D8
	CD01 02FB DC01 02F5 0102 F406 02FF 0302
10	FAF5 CE01 02FC FCF6 D801 02F6 F5FB 05E1
	02FA F201 02C1 ECEF EEE9 0102 E7BB EDBB
	EDFB 0001 02E9 EC01 02EC F3E7 8005 01EE
	D000 0102 D5F8 F401 02FF 0302 F7F3 CFF4
	0202 FFE4 E6E9 FBD6 D900 FCF4 0302 FF03
	FB02 02FC 0602 CFED 0102 E609 02EA 0000
15	00F0 00FB DA00 EBBB 00F0 F3F0 00E7 FC00
	F2E1 B895 8E9C 00D3 00DF F701 02F6 EB04
	02FF 0202 FCD8 0102 CCFC ED02 02FF FCE2
	0001 02F4 FC01 02F4 0202 FF02 02FB EAEA
	E298 F8FC 0001 02EC F403 0280 FE02 02FA
20	02F4 0202 FF0B 02FB F0F1 F1E1 EB00 0102
	F4FC 0102 F402 02FF 0202 FBF0 F3F1 E1DD
	FB04 02F8 00D3 EDE7 D200 0102 EF00 0102
	E3C2 F8F4 0502 FD02 02EA E7E3 E3B4 F801
	0402 FD02 02FF F0DC FFFE FA00 E900 0102
25	F2F0 0102 BCB9 EFEC D201 02F4 0702 FFB9
	F7E1 B8C1 008B 01FB 0102 0004 0200 0102
	FC00 C9D3 D7DD 0001 02AF 8000 0302 F6EB
	E900 FA00 0102 DAA0 0102 B7E9 0102 EEEE
	D900 FBF9 0001 02DA F901 02F7 F600 0102
30	1002 FF02 02FB FCEC EE00 FCFC 0102 F403
	02FF 0202 FC00 0000 00C5 EFF2 F000 0102
	E8E6 0001 0200 F8E6 0000 EFEE E5EF EA00
	00E7 F4F5 FCF4 ECEE EEEE E5EF EA00 00E5
	DA00 0202 E8E8 E8E7 FC00 00D3 FB00 0102
35	00E7 C7BC E500 0102 0097 0502 E800 E800

40

45

50

55

EP 0 475 554 A2

Virtual block number 24 (00000018), 512 (0200) bytes

5	E800	DBF8	0002	02FB	00D5	00E3	D700	0102
	CC00	0202	E300	8301	0202	00E5	D900	0102
	D8B9	10FB	F001	0200	0202	00FB	00EA	C300
	EF00	0102	FBED	0000	00F4	F900	EEEE	00FB
	0008	0001	4545	5246	0400	0800	0101	0151
	BD01	050E	FCD8	C6E3	E3E8	00D5	E700	0102
10	5845	0400	0800	0135	5458	4504	0008	0001
	3654	5845	0400	0800	0143	4F4C	4C41	4D06
	0800	0131	5458	4504	0008	0001	3254	5845
	0400	0800	0133	5458	4504	0008	0001	3454
	0500	0800	0134	3154	5845	0500	0800	0135
	3154	5845	0500	0800	0136	3154	5845	0500
	5845	0400	0800	0132	3154	5845	0500	0800
15	0131	3154	5845	0500	0800	0133	3154	5845
	0137	3154	5845	0500	0800	0139	5458	4504
	0008	0001	3031	5458	4505	0008	0001	3854
	001C	0000	1D90	0000	0A00	0259	5043	5254
	5306	0008	0001	434F	4C4C	414D	0600	0800
20	0200	4544	4F43	2405	0000	249A	00E9	0200
	4E49	414D	2443	0600	0800	014E	4941	4D04
	0004	019D	0200	4E49	4454	5305	0000	0004
	019D	0200	4154	4144	2405	0000	0B60	0189
	0000	0145	0189	0200	5252	4544	5453	0600
	0000	0401	9D02	0054	554F	4454	5306	0000
25	0300	0001	4401	BD02	0053	544E	4154	534E
	4F43	5F47	4E49	5254	535F	5241	4843	2416
	0450	01D0	0450	00D0	0450	FFFF	FFFF	8FD0
	0813	50D5	E6A7	CF05	E702	0027	0153	414D
	B001	50D5	00D1	FFFF	0000	001D	9000	0003
30	0008	5800	1500	2900	29FA	500A	0B00	0504
	FB52	DEAD	3C50	D547	1850	E0AD	D1F2	1C31
	3154	5845	0500	00FB	E0AD	00D0	DEAD	F4AD

35

40

45

50

55

APPENDIX G

5 Dump of file [YOAV_B.COLOR.COMPUTER.PATENT]PAT2.OBJ;2
 on 18-NOV-1990 File ID (11403,7,2)
 End of file block 14 / Allocated 15

10 Virtual block number 1 (00000001), 512 (0200) bytes

3A383120 30393931 2D564F4E 2D383130
 2E315604 32544150 04020000 00000031
 33562043 20584156 01000010 00000000
 15 00000000 00000000 00000000 00003831
 69614620 0AD55000 05040001 00048081
 3C80F850 00010402 02003135 302D312E
 6F432072 6F662073 74616F6C 66206425
 20657461 636F6C6C 61206F74 2064656C
 20 50000004 00000001 00000008 00000008
 00000008 F0502000 01055D64 255B6665
 B5F6AD50 B05050F7 5001C250 04A232F8
 AD00D052 A11C0001 049E5E0C C20004FA
 04BCDE51 F6AD32F8 AD50D050 F8ADC450
 50D05010 A2403250 F6AD3201 3A19F6AD
 25 CDD0C718 F6ADB5F6 AD50B050 F6AD01A3
 F8AD50D0 50F8ADC0 5050D050 60413250
 F4AD01D0 F8AD00D0 53A41C00 01049E54
 FE1C0005 049E5E10 C2001C04 0450FFF8
 AD5CD05C F4ADC45C 5CD05C10 A34C325C
 30 F8ADD001 50D52A1E 52F8ADD1 5204A332
 52F8ADD1 5204A332 F8AD00D0 D91F5CF8
 ADD15C04 A332F8AD 5CD05C01 F8ADC1F4
 4250D0E2 1C434F4C 4C414D06 0001FB5C
 DD015C04 F4ADC552 F8ADD001 50D5541E
 35 49525006 0003FB64 DF01F4AD DD01F8AD
 DD011A12 1FF0C34C D55CF8AD D01FF0C3
 AF1F5CF8 ADD15C04 A332F8AD 5CD05C01
 F8ADC104 50FFFFFF FF8FD080 1C46544E
 AE310319 10AC50D1 50FE12CD 32FE12CD
 40 00B05EFE 0CCE9E00 7C040450 00008F32
 FE14CD00 0000008F 500150D5 01823103
 15FE12CD FE10CDB1 FE10CD00 F750D501

Virtual block number 2 (00000002), 512 (0200) bytes

```

5  54FE14CD 56015418 FE10CDFE 0ECD81FE
   0ECD00B0 00AB3103 13FE10CD FE12CDB1
   32510BC4 51FE10CD 3252FE18 CD405650
   51C050FE 0ECD3251 0BC4DE51 FE10CD32
   A1FE14CD 52505254 76545260 52506450
10  FE18CD40 A4020200 565051C0 50FE0ECD
   56FE10CD 32520BC4 52FE10CD 32AD19FE
   10CDFE0E CDB1FE0E CD52B052 01FE0ECD
   52FE14CD 56546243 565204BC DE5352C0
   53FE10CD 32520BC4 52FE10CD 325652C0
15  B00150D5 00B831FE 18CD4652 50525076
   801C5452 51530400 02FB7E54 70545262
   FE0ECD32 530BC453 FE12CD32 50FE14CD
   5650D555 18FE10CD FE0ECD81 FE0ECD00
   52FE18CD 42565253 C052FE0E CD32530B
   C453FE10 CD3254FE 18CD4256 5253C052
20  FE10CDFE 0ECD81FE 0ECD52B0 5201FE0E
   CDA1FE14 CD525052 50765054 60545264
   53FE10CD 32520BC4 52FE12CD 32545280
   C054FE10 CD32520B C452FE12 CD32AD19
   52FE10CD 32530BC4 53FE10CD 32555262
25  52FE14CD 56556243 565204BC DE5352C0
   A1FE81FE 10CD01FE 12CD3DFE 18CD4452
   50525576 55526652 FE18CD42 565253C0
   12CD32FE 12CD00B0 FE543103 1810AC52
   D152FE12 CD32FE12 CD52B052 01FE12CD
30  CDFE10CD B1FE10CD 00B0FE14 CD008000
   00008F50 0100BA31 031910AC 52D152FE
   32530BC4 53FE12CD 32546342 56530CBC
   DE52FE10 CD3250FE 14CD5601 4B18FE12
   01FE10CD A1FE14CD 52505250 76505460
35  54526452 FE18CD42 565253C0 52FE10CD

```

40

45

50

55

Virtual block number 3 (00000003), 512 (0200) bytes

5	12CD32FE	12CD52B0	5201FE12	CDA16044
	52508002	02005255	76555266	52FE18CD
	C3310318	FE12CDB5	FE12CD52	B05252F7
	5210AC01	C3FF4731	031810AC	52D152FE
	52FE10CD	32FE10CD	52B05252	F75201C0
	52FE12CD	32FE14CD	00000000	8F500100
10	530BC453	FE10CD32	54634256	530CBCDE
	52FE10CD	3250FE14	CD564C18	10AC52D1
	10CDA1FE	14CD5250	52507650	54605452
	648052FE	18CD4256	5253C052	FE12CD32
	FE12CD32	500CBCDE	54FE12CD	32B41910
15	AC52D152	FE10CD32	FE10CD52	B05201FE
	53C052FE	12CD3253	0BC453FE	12CD3255
	526252FE	14CD5655	62435652	0CBCDE53
	FE12CDB5	FE12CD52	B052FE12	CD01A360
	44525052	55765552	6652FE18	CD425652
	70111850	04AC7150	60415650	0CBCDE51
20	8010AC32	5E0CC200	FC0104FF	3E310319
	56500CBC	DE5150C0	5014AC32	5110AC32
	50D501BD	31045000	00000000	0000008F
	AC323E12	0114ACB1	01933104	50000000
	00000000	008F700F	1804AC50	71506041
25	51D15001	C25018AC	325110AC	32291250
	04AC7150	60415650	0CBCDE51	01C05110
	14ACB101	01503104	50000000	00000085
	00008F70	0150D50F	11045008	70091250
	5150C050	14AC3251	10AC3253	0CBCDE52
30	10AC3201	50D50142	31045008	700A1201

35

40

45

50

55

Virtual block number 4 (00000004), 512 (0200) bytes

5	325404AC 52635262 4356520C BCDE5310
	AC326B18 60416342 51500CBC DE5101C2
	62435652 0CBCDE53 10AC3250 62435652
	0CBCDE53 01C25352 C05214AC 325310AC
	5210AC32 52DD0152 01C25214 AC3252DD
10	80020200 015218AC 32545066 50526252
	008F5001 0911F8AD 52505254 76545064
	FEDDCF06 FB7E04AC 700CACDD 0152DD01
	51520CBC DE5352C0 5214AC32 5310AC32
	550CBCDE 5401C054 10AC32F8 AD000000
15	10AC3256 04AC6256 62435652 0CBCDE53
	52C05214 AC325310 AC327318 62436544
	52624356 520CBCDE 5301C053 10AC3298
	54624356 520CBCDE 5352C052 14AC3253
	DD015201 C05210AC 3252DD01 5201C252
	14AC3252 DD015218 AC325654 66545262
20	00000000 8F500811 F4AD5250 52567656
	5064FE40 CF06FB7E 04AC700C ACDD0152
	F757801C 0001049E 5EB8AE9E 00FC0404
	50547054 526052F4 AD5654F8 AD56F4AD
	C6AD00B0 FFEAC6AD 01033D18 A74310A7
25	42B052C6 AD3253C6 AD32FFFF FFC6ED00
	00008F50 5352C053 CAAD3252 0EC452C6
	AD32CAAD 00F70150 D5541804 A7C6ADB1
	505354C0 5352C052 CAAD3253 18A74232
	52C6AD32 540EC454 C6AD3220 A7430000
30	C680AD00 B0AF1904 A7C6ADB1 C6AD52B0
	5201C6AD A1FFC3CA AD01023D 20A74308
	AD32520E C452C6AD 325F1818 A742CAAD
	B152C6AD 32CAAD03 B07F1804 A7C6ADB1
	53C6AD32 550100C7 42565253 C05202C2
35	52CAAD32 530BC453 C6AD3254 52C054CA

40

45

50

55

Virtual block number 5 (00000005), 512 (0200) bytes

5	A7445250	52557655	10665552	60520100
	C7425652	53C05201	C252CAAD	32530BC4
	F2C6AD52	B05201C6	ADA1A119	18A742CA
	ADB152C6	AD32CAAD	52B05201	CAADA120
	CAAD00B0	0150D500	CA310319	04A78002
	0200C6AD	B1C6AD00	B0811904	A7C6ADB1
10	781810A7	42C8ADB1	52C6AD32	C8AD00B0
	0100A131	031918A7	42CAADB1	52C6AD32
	52C6AD32	5452C054	C8AD3252	53C05221
	C452CAAD	32530000	016B8FC4	53C6AD32
	AD3220A7	42DF0152	0EC452C6	AD3252DD
15	0152CAAD	3203DD01	52DD0152	18A74232
	52505250	76FC7ACF	06FB7E52	70805201
	00C74256	5253C052	C8AD3253	0BC453C6
	52B05201	CAADA188	1910A742	C8ADB152
	C6AD32C8	AD52B052	01C8ADA1	0940C744
20	1804A7C6	ADB1C6AD	52B05201	C6ADA1FF
	60310318	18A742CA	ADB152C6	AD32CAAD
	CAADB152	C6AD32CA	AD00B001	50D50124
	31031904	A7C6ADB1	C6AD00B0	FF393103
	00000000	8F5050D5	00D43103	8015CAAD
25	C8ADB1C8	AD00F701	00FB3103	1918A742
	0000016B	8FC452C6	AD3250F4	AD566A18
	10A742BC	ADB152C6	AD32BCAD	00B0F4AD
	016B8FC4	52C6AD32	540940C7	42565253
	C052BCAD	325352C0	5321C453	CAAD3252
30	50546054	52645209	40C74256	5253C052
	BCAD3253	52C05321	C453C8AD	32520000
	C6AD3296	1910A742	BCADB185	52C6AD32
	BCAD52B0	5201BCAD	A1F4AD52	50525076
	798FC452	C6AD3254	52C054C8	AD325253
35	C0520BC4	52CAAD32	53000000	798FC453

40

45

50

55

Virtual block number 6 (00000006), 512 (0200) bytes

5	B0C74250	01B0C742	F4AD5052	53C052CA
	AD325352	C0530BC4	53C8AD32	52000000
	18A742CA	ADB152C6	AD32CAAD	52B05201
	CAADA1FF	2EC8AD01	CAAD3D01	B0C74401
	C4AD00B0	FEDF3103	1804A7C6	80020200
	ADB1C6AD	52B05201	C6ADA1FF	06310318
10	54310319	1CA7C2AD	B1C2AD00	B0010276
	3103191E	A7C4ADB1	F8AD52D0	52C4AD32
	0E310319	18A7BEAD	B1BEAD00	B050D502
	31310319	1AA7C0AD	B1C0AD00	B050D502
	01C6ADA1	D0AD4000	0000008F	5050C6AD
15	32011E18	04A7C6AD	B1C6AD00	B050D502
	031952E4	ADD15216	A732E080	ADE4ADD0
	E4AD00D0	E31904A7	C6ADB1C6	AD50B050
	5012A732	ECAD00D0	0150D501	53310319
	50E8ADD1	5014A732	E8AD00D0	01017B31
20	0150D500	FF310319	50F0ADD1	5010A732
	F0AD00D0	0150D501	29310319	50ECADD1
	50527652	50645009	40C74056	50F0AD50
	C15021C4	50BEAD32	52CCAD56	CCAD6750
	52765250	64500EEC	C7408056	50ECAD50
25	C15021C4	50C0AD32	52CCAD56	CCAD5050
	52765250	64501498	C7405650	E8AD50C1
	5021C450	C2AD3252	CCAD56CC	AD505050
	501A44C7	405650E4	AD50C150	21C450C4
	AD3252CC	AD562013	06A7B5CC	AD505050
30	BAAD3201	50D54118	04A7BAAD	B1BAAD00
	B04C13CC	AD53CCAD	50505052	76525064
	50645050	56506041	4D855004	BCDE51E0
	ADC051BA	AD3253CC	AD5655D0	AD425652
	01F0ADC1	C21904A7	BAADB1BA	AD50B050
35	01BAADA1	D0AD4250	50505576	55536053

35

40

45

50

55

Virtual block number 7 (00000007), 512 (0200) bytes

```

5   ADC1FF04 31031850 F0ADD150 10A732E0
    AD50D050 E0ADC050 04A732F0 AD50D050
    14A732E8 AD50D050 01E8ADC1 FEDA3103
    1850ECAD D15012A7 32ECAD50 D05001EC
    1850E4AD D15016A7 32E48002 0200AD50
    D05001E4 ADC1FEB0 31031850 E8ADD150
10  521FF0C7 42D053F8 ADD052C6 AD320150
    D52B1804 A7C6ADB1 C6AD00B0 FE863103
    B05201BE ADA1D819 04A7C6AD B1C6AD50
    B05001C6 ADA16243 D0AD4050 50C6AD32
    B1C0AD52 B05201C0 ADA1FDF4 31031818
15  A7BEADB1 F8AD52D0 5201F8AD C1BEAD52
    C4ADA1FD AE310318 1CDCA7C2 ADB1C2AD
    52B05201 C2ADA1FD D1310318 1AA7C0AD
    801C0001 049E5EFF 58CE9E00 0450D504
    FD8B3103 181EA7C4 ADB1C4AD 52B05201
20  031904A2 FF74CDB1 FF74CD00 B050D502
    3C310319 04A2FF76 CDB1FF76 CD00B052
    01033DFF 64CD4018 A24CB05C FF62CD32
    50FF62CD 32FFFFFF 62ED008F 99021431
    C0310319 FF6ACDFF 72CDB1FF 72CD00B0
25  FF64CD4C 01B05CFF 74CD32FF E6FF62CD
    FF6ECDB1 FF6ECD00 B00150D5 01963103
    19FF68CD FF70CDB1 FF70CD00 B050D501
    0150D501 40310319 FF64CDFF 6CCDB1FF
    6CCD00B0 0150D501 6B310319 FF66CD80
    40FF6CCD 4CB05CFF 62CD3250 FF62CD32
30  0150D529 1804A2FF 62CDB1FF 62CD00B0
    5CFF74CD 32FF60CD 00B0DA19 04A2FF62
    CDB1FF62 CD5CB05C 01FF62CD A1FF58CD
    DF015CFF 60CD32FF 58CD4CFF 60CDB05C
35  FF74CD32 0150D560 1818A24C FF60CDB1

```

Virtual block number 8 (00000008), 512 (0200) bytes

5	5CFF76CD	3250FF60	CD3251FF	60CD326C
	50D05CD0	AD4CDEF2	D0CF01FB	FF58AECD
	FF74CD32	FF60CD5C	B05C01FF	60CDA1A4
	AD416C40	505C1FF0	C24CD050	D0AD40D0
	FF78CDDF	015CDD01	80020200	5C18A24C
10	325CFF74	CD32A319	18A24CFF	60CDB15C
	FF60CD00	B0F37ECF	04FB01B0	C24CDF01
	5C000000	798FC45C	FF74CD32	A4ADDF01
	51D0AD40	D05CFF76	CD3250FF	60CD3201
	50D53D18	18A24CFF	60CDB15C	FF74CD32
15	74CD32FF	60CD5CB0	5C01FF60	CDA16041
	FF78CD4C	505CFF60	CD32501F	F0C24CD0
	0318FF64	CDFF6C80	CDB1FF6C	CD5CB05C
	01FF6CCD	A1C61918	A24CFF60	CDB15CFF
	5C01FF70	CDA1FE98	310318FF	66CDFF6E
20	CDB1FF6E	CD5CB05C	01FF6ECD	A1FEC331
	FF72CDB1	FF72CD5C	B05C01FF	72CDA1FE
	6D310318	FF68CDFF	70CDB1FF	70CD5CB0
	CDA1FDEC	31031804	A2FF74CD	B1FF74CD
	5CB05C01	FF74CDA1	FE423103	18FF6ACD
25	0001049E	5E08FDC2	003C0104	FDC63103
	1804A2FF	76CDB1FF	76CD5CB0	5C01FF76
	150B10A5	43B110A5	4352B052	2000C542
	F752FAAD	3253FAAD	32FAAD00	F755801C
	FB06A500	B004A503	B0081201	200CC5D1
	FFD7FAAD	01033D04	50FFFFFF	FF8FD008
30	32F8AD00	B0661804	A5FAADB1	FAAD00B0
	0450FFFF	FFFF8FD0	081350D5	F19FCF00
	500BC450	FAAD3254	5CC054F8	AD325C0B
	C45CFAAD	32461810	A542F8AD	B152FAAD
35	F8ADA101	00C5445C	505C5276	52506450
	65565220	10C54C6E	5C50C05C	F8A5AD32

40

45

50

55

Virtual block number 9 (00000009), 512 (0200) bytes

```

5      04A5FAAD B1FAAD52 B05201FA ADA1BA19
      10A54CF8 ADB15CFA AD32F8AD 5CB05C01
      01049E5E 18C2001C 04045000 008F32FC
      CBCF00FB F724CF01 FB20C0C5 DD019A19
      52B05252 F7528002 02000120 C4C442C1
10     52EAAD32 53EAAD32 EAAD00F7 54ED1C00
      52EAAD32 EEAD00B0 00F83103 1904A4EA
      ADB1EAAD 00B0FFE2 EAAD0103 3D08A443
      0100A631 031908A4 42ECADB1 52EAAD32
      ECAD00B0 0100D231 031918A4 42EEADB1
      AD71F0AD 52705250 64506456 5220D4C4
15     4C565C50 C05CEAAD 325004C4 50ECAD32
      AD32F0AD 00800000 00000000 008F700C
      18F0AD73 50D51311 F0AD0870 081508F0
      4C325CEA AD32525C C052ECAD 325C50C0
      5C21C45C EEAD3250 0000016B 8FC450EA
20     7EF0AD70 20A44CDF 015C0EC4 5CEAAD32
      5CDD015C EEAD3203 DD015CDD 015C18A4
      A44CECAD B15CEAAD 32ECAD5C B05C01EC
      ADA10940 C4425C50 5C5076F4 4CCF06FB
      A1FF2F31 E0031818 A442EEAD B152EAAD
25     32EEAD52 B05201EE ADA1FF5B 31031808
      1C000104 9E5E3CC2 00FC0150 D504FF08
      31031804 A4EAADB1 EAAD52B0 5201EAAD
      52E4ADD1 5204A732 E4AD00D0 DCAD52D0
      5253D053 52C45218 A732531A A7325780
30     52E8AD52 C152E4AD 21C5012D 1852E8AD
      D15208A7 423252E4 ADD0E8AD 00D05318
      52E8ADD1 5208A742 3252E4AD D0E8AD52
      D05201E8 ADC122E8 C7420000 00008F50
      A732E0AD ECADD0EC AD00D0AD 1952E4AD
35     D15204A7 32E4AD52 D05201E4 ADC1D419

```

40

45

50

55

Virtual block number 10 (0000000A), 512 (0200) bytes

5	52C05322	E7C79852	ECAD21C5	2F1306A7
	B50150D5	01F53103	1952ECAD	D152AA1E
	E0AD52D0	52E0ADC0	52DCADC4	5252D052
	1CA73213	12D8AD53	D8AD1A44	C7435053
	12D8AD53	80020200	01933103	1952F0AD
10	D1521CA7	32F0AD00	D0D8AD08	50010511
	52645214	98C74356	5352C053	22E6C798
	52F0AD21	C554D8AD	560150D5	018B3103
	32F4AD00	D0010137	31E0AD52	D052DCAD
	E0ADC10E	12D4AD53	D4AD5250	52547654
	5352C053	22E5C798	52F4AD21	C554D4AD
15	560150D5	01253103	1952F4AD	D1521AA7
	E0ADC080	5252D052	18A73212	12D0AD53
	D0AD5250	52547654	5264520E	ECC74356
	C6AD00B0	0150D500	C3310319	52F8ADD1
	5218A732	F8AD00D0	00D431E0	AD52D052
20	40C74356	5352C053	C6AD3252	F8AD21C5
	54D0AD56	50D50093	31031908	A7C6ADB1
	014B1852	C8ADD152	04A732C8	AD00D059
	13CCAD53	CCAD5250	52547654	52645209
	1FF080C7	4CD050E0	ADD05CC8	ADD05522
25	E8C74456	545CC054	C6AD325C	C8AD21C5
	AD5CD05C	01C8ADC1	22E8C744	5C505C55
	76555260	52506450	CCAD5652	6C40565C
	ADC1FF6F	31031808	A7C6ADB1	C6AD52B0
	5201C6AD	A1B6195C	C8ADD15C	04A732C8
30	F4ADC1FF	40310318	52F8ADD1	5218A732
	E0AD52D0	5201E0AD	C1F8AD52	D05201F8
	1C85A732	F0AD52D0	5201F0AD	C1FEDE31
	031852F4	ADD1521A	A732F4AD	52D05201
	D1521EA7	32ECAD52	D05201EC	ADC10150
35	D5FE7B31	0613D8AD	530B1852	F0ADD152

Virtual block number 11 (0000000B), 512 (0200) bytes

```

5      423252E4 ADD0E8AD 00D06318 52E4ADD1
      5204A732 E4AD00D0 FE0E3103 1852ECAD
      0000447F 8F645422 E8C74356 53E8AD52
      C152E4AD 21C5013D 1852E8AD D15208A7
      3252DA02 0200E4AD D0E8AD52 D05201E8
10     ADC122E8 C7435250 52547654 00000000
      000C049D 1952E4AD D15204A7 32E4AD52
      D05201E4 ADC1C419 52E8ADD1 5208A742
      0153F8AD D0FFF8CD 008F9852 EF1C0001
      049EFF1C 4E49414D 24430600 165E28C2
15     43E4ADD1 53F8ADD0 E4AD00D0 2000C243
      50D0D31C 30325458 45050001 FBF8ADDD
      54584505 0002FBF8 ADDD01E4 ADDD015C
      E4AD5CC1 5CF8AD0B C550D537 182000C2
      CB192000 C24CE4AD D15CF8AD D0E4AD5C
20     D05C01E4 ADC12010 C24C50D0 E21C3132
      D0FFF8CD 00D08DF8 AD03F3FA 66CF00FB
      20C0C250 D0E21C32 32545845 050000FB
      00D0635C D05320C4 C243DE5C 50D0CF1C
      33325458 45050001 FBF8ADDD 0153F8AD
      ADDD01E0 ADDD0153 E0AD5CC1 5CF8AD04
25     C5381E20 C4C243E0 ADD153F8 ADD0E0AD
      ADD0E0AD 5CD05C01 E0ADC120 D4C2435C
      505C504E 8C1C3432 54584505 0002FBF8
      1F20C8C2 ECADD1EC AD00D0FA CECF00FB
      97F8AD03 F3C81F20 C4C24CE0 ADD15CF8
30     D0C2F4AD D1F4AD00 D001009E 31031F20
      CCC2F0AD D1F0AD00 D00150D5 00C43103
      00FB22E7 C25C905C F4ADF622 E6C25C90
      5CF0ADF6 22E5C25C 905CECAD F67D1E20
      AD21C5F8 AD00D050 D53E1E20 C4C2E8AD
35     D1E8AD00 D0D11C38 324C4143 4F4C0700

```

40

45

50

55

Virtual block number 12 (0000000C), 512 (0200) bytes

```

5      32545845 050004FB E8ADDF01 F8ADDD01
      7E507050 22E8C24C 565CE8AD 5CC15CF8
      5CD05C01 F4ADC1C4 1F20C4C2 E8ADD1E8
      AD5CD05C 01E8ADC1 D9F8AD03 F3C71C37
      03050200 31031E20 CCC2F0AD D1F0AD5C
10     D05C01F0 ADC1831F 20D0C2F4 ADD1F4AD
      6E6905F0 1B000000 00000600 BE0C3254
      41500400 00000700 BC0BF152 000001FF
      66656F63 5F636F6C 6C610AEB 1B000000
      64000600 BE110000 006400BF 06666F64
15     036F00BF 06796B73 656C6F68 4308ED1B
      0000011C 000600BE 0F000000 B800BF06
      70000600 BE0F0000 01E400BF 06626C61
      764505F0 1B000004 8C000600 BE0C0000
      EA1B0000 0C1C0006 00BE1200 0005AA00
      BF067374 6F6E4B74 655308ED 1B000006
20     6C06EF1B 00000E78 000600BE 0D000002
      5B00BF06 65726175 71537473 61654C0B
      0635326C 61636F6C 07EE1B00 000F5800
      0600BE0E 000000E0 00BF0631 6C61636F
      000002FC 00BF0638 326C6163 6F6C07EE
25     1B000010 90000600 BE0E0000 013500BF
      00000610 01E909B9 09000001 D600BF06
      6E69616D 04EE1B00 00138C00 0600BE0B
      00F8EE00 F5E700EF C4ED0202 FF0202FA
      F2E9EC00 E8F40402 00B9FB80 1B000000
30     0302C2A7 F700ECDD 030200AE 9D00FA00
      BD9E00F4 F700ECEB F90802FF 0E02FAED
      009201F5 00890100 0202FAF2 00EFEC00
      E2D6E2FB 0302FE0F 02ECC299 F700E9E7
      02EF00A3 010102F0 ECEF8103 02F5E903
35     02E1E900 FCF2E303 02F30702 FF00F1F6

```

40

45

50

55

Virtual block number 13 (0000000D), 512 (0200) bytes

5	00ECECEC	E9D70102	000302F0	F0F0E9ED
	E8F8B886	F8000202	F000A801	02EC0001
	F50102DE	000202F0	000102EE	F20102FD
	0902ABCA	9C00B400	0102FBDB	E0E0E0FC
	00850202	FE0602EA	EAA4B0D3	0102E7E0
10	E90102F3	00EACA01	02000402	ECECECED
	DE0102F4	0102FF04	02FAFBF6	F00102AA
	000202F5	EF010200	FCFC00F2	DAF48005
	E8EC00FB	000302E7	AD0102F2	EE0102F4
	0102FC04	02BDB0EB	B95BF6E2	00ECECF2
	01029DF2	EAE2EAE1	ED00A700	0102FBE0
15	00F00001	02E9ECDF	00E8F1DF	00E4F900
	C7C4F2F9	F7F7F700	F4F0EEFB	FBB7E500
	0102FBFB	FBF4B8EB	000102FA	EE0102FF
	00015452	51530400	08000138	324C4143
	4F4C0700	08000101	00FD00BD	01FE050E
20	00013732	54584505	00080001	434F4C4C
	414D0600	08000146	544E4952	50060008
	00080001	32325458	45050008	00013332
	54584505	00080001	34325458	45050008
	41434F4C	0700FC00	00109000	000A0002
25	30325458	45050008	00013132	54584505
	02004E49	414D2443	06000800	014E4941
	4D04000C	0000138C	00000A00	0238324C
	0004019D	02004154	41442405	000024F8
	01890200	45444F43	24050000	156200E9
30	06000000	04019D02	0054554F	44545306
	00000004	019D0200	4E494454	53050000
	534E4F43	5F474E49	5254535F	52414843
	24160000	002C0189	02005252	45445453
	FF3F3103	1E20C8C2	ECADD1EC	AD53D053
35	01ECADC1	FF63E502	001D0053	544E4154

40

45

50

55

Virtual block number 14 (0000000E), 512 (0200) bytes

5	00000000	00000000	00000000	0000FFFF
	00000013	8C000003	00080004	045001D0
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
10	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
15	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
20	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
25	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
30	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
	00000000	00000000	00000000	00000000
35	00000000	00000000	00000000	00000000

40

45

50

55

Appendix H

Annexes F and G comprise the object code of files called 'pat1.obj' and 'pat2.obj', respectively. This Annex comprises the source code for a file called 'patdum.c'.

'patdum.c' explains and demonstrates how a calling program to 'pat1.obj' and 'pat2.obj' should be written. 'patdum.c' is written in C, but is mostly composed of comments, found between #ifdef and #endif. Any C programmer will understand from it how to write a calling program according to his needs. Parameters that are left to the programmer's control include the dimension of the input and output digital representation, the number of patches measured and the structure of the grid. The programmer needs to supply, using his version of 'patdum.c', the measured data (Tables 30 and 32 in Fig. 1) and the programmer needs to use the program to receive the results (Table 36).

'patdum.c' should be compiled using the C compiler on the VMS operating system on the VAX computer manufactured by Digital Equipment Corporation. This will produce an object code file that is usually called 'patdum.obj'. Assuming that the compiler is invoked by the command, 'cc', then the full command line is typically:

```
cc patdum
```

'pat1.obj', 'pat2.obj' 'patdum.obj' and a library should be linked together on VMS using a linker that is typically available on the VAX. The library is the standard library provided for C programs. Assuming that the linker is invoked by 'link', and that the library is called 'c\$1', the full command

line is typically:

```
link pat1,pat2,patdum,c$1/opt
```

This produces an executable file.

'patdum.c' is composed of C routines, all called ext..(). Routines ext1() to ext6() present output from pat1.obj to the outside world, and ext8() to ext17() take input from the outside world and present it to pat1.obj. Routines ext20() through ext22() give input to pat2.obj and ext23(), ext24() and ext27() take output from pat2.obj and present it to the outside world. The programmer is free to leave the output routines as they are but most provide useful input routines.

APPENDIX H

Page 1

PRISMA Prepress System

* Copyright (c) 1985, SCITEX Corporation Ltd.
* All Rights Reserved
*

```
* Module name:          patdum ( for patent application )
* Programmer's name:    Yoav Bresler
* Date:                 18-Nov-1990
* Language:             C
* Where to find it:     scc; sd [.patent]
```

```

*       The following is a description of the interface to
*       'pat1' and 'pat2'.
*       Examples are provided within, but the whole is not
*       a working example of such an interface.
*****

```

```
#ifndef COMMENTS_NOT_CODE
COMMENTS_NOT_CODE shouldn't be defined,
so text between 'ifndef' and 'endif' is comments.
#endif
```

```

*
*
*
*
*
*
***** Interface to PAT1 *****
void ext1(i)    int i;
{
10  #ifdef COMMENTS_NOT_CODE
    Let it be known that 'i' is the dimension of the
    digital representation
    which is the output of the resulting Table 36.
    Example 1: i=3 for cyan,magenta,yellow
    Example 2: i=4 for cyan,magenta,yellow,black
15  #endif
};
void ext2(i)    int i;
{
    #ifdef COMMENTS_NOT_CODE
    Let it be known that 'i' is the dimension of the
    digital representation
20  which is the input of the resulting Table 36.
    Example 1: i=3 for cyan,magenta,yellow
    Example 2: i=4 for cyan,magenta,yellow,black
    #endif
}
void ext3(i,j)  int i,j;
25  {
    #ifdef COMMENTS_NOT_CODE
    Let it be known the the grid of Table 36,
    in the 'i'-th input dimension is define by 'j' numbers.
    'i' is in the range 0 to 3
    Example 1: if the cyan grid is
30  (0,10,20,30,40,50,60,70,80,90,100)
    then j=11 for i=0.
    #endif
}
void ext4(i)    int i;
35  {
    #ifdef COMMENTS_NOT_CODE
    Let it be known that 'i' is the maximum numbers
    defining a grid in any of the input dimensions.
    #endif
}
void ext5(i,j,k)    int i,j,k;
40  {
    #ifdef COMMENTS_NOT_CODE
    Let it be known that 'k' is the number at the
    'j'-th grid stop at the 'i'-th input dimension.
    Example 1: if the cyan grid is
45  (0,10,20,30,40,50,60,70,80,90,100)
    than k=90 for i=0 and j=9.
    #endif
}
/*

```

50

55

```

5      *
      *
      *
      *
      *
      *
      */
void ext6(p)    short *p;
10 {
    #ifdef COMMENTS_NOT_CODE
        Let it be known that 'p' points to a table which is the
        right side of Table 36.
        The table is completely defined by functions ext1..ext6.
        The left side of the table is composed of entries which
15 are digital representation (of the printer)
        on the defined grid.
        The order of the entries is such that they first vary
        along the first dimension, than along the second etc.
        Example 1:    in this exmple the left side and the right side
20 of the table contain the same values.

        int i,j,k;
        static short table[5*5*5*3]=
        {
            /* order: cyan,magenta,yellow,  cyan,magenta,yellow, ... */
            /* at yellow = 0 */
25 /* at:
            /*magenta=0 */    cyan=0,    cyan=64,    cyan=128,    cyan=192,    cyan=155 */
            /*      64 */    0,0,0,    0,0,64,    0,0,128,    0,0,192,    0,0,255,
            /*      128 */    0,64,0,    0,64,64,    0,64,128,    0,64,192,    0,64,255,
            /*      192 */    0,128,0,    0,128,64,    0,128,128,    0,128,192,    0,128,255,
            /*      255 */    0,192,0,    0,192,64,    0,192,128,    0,192,192,    0,192,255,
30 /* at yellow = 64 */
            /* at:
            cyan=0,    cyan=64,    cyan=128,    cyan=192,    cyan=155 */
            64,0,0,    64,0,64,    64,0,128,    64,0,192,    64,0,255,
            64,64,0,    64,64,64,    64,64,128,    64,64,192,    64,64,255,
            64,128,0,    64,128,64,    64,128,128,    64,128,192,    64,128,255,
            64,192,0,    64,192,64,    64,192,128,    64,192,192,    64,192,255,
35 64,255,0,    64,255,64,    64,255,128,    64,255,192,    64,255,255,
            /* at yellow = 128 */
            /* at:
            cyan=0,    cyan=64,    cyan=128,    cyan=192,    cyan=155 */
            128,0,0,    128,0,64,    128,0,128,    128,0,192,    128,0,255,
40 128,64,0,    128,64,64,    128,64,128,    128,64,192,    128,64,255,
            128,128,0,    128,128,64,    128,128,128,    128,128,192,    128,128,255,
            128,192,0,    128,192,64,    128,192,128,    128,192,192,    128,192,255,
            128,255,0,    128,255,64,    128,255,128,    128,255,192,    128,255,255,
            /*
            *

```

55

```

5      *
      *
      *
      *
      *
      *
      */
int ext9()
10 {
    #ifdef COMMENTS NOT CODE
        Supply the dimension of the digital representation
        which is the input of the resulting Table 36.
        Example 1: 3 for cyan,magenta,yellow
        Example 2: 4 for cyan,magenta,yellow,black
    #endif
15    /*Example:*/ return(3);
    };
    int ext10(i,j)        int i,j;
    {
20    #ifdef COMMENTS NOT CODE
        Supply the number at the 'j'-th grid stop at
        the 'i'-th input dimension.
        Example 1: if the cyan grid is
        (0,10,20,30,40,50,60,70,80,90,100)
        than k=90 for i=0 and j=9.
    #endif
25    /*Example 2:*/
        int k = i*64;
        if(k==256)    k=255;
        return(k);
    }
    int ext11()
30 {
    #ifdef COMMENTS NOT CODE
        Supply the RGB dimension of tables 1 and 2 in Fig. 4.
    #endif
    /*Example:*/ return(3);
    }
    int ext12()
35 {
    #ifdef COMMENTS NOT CODE
        Supply the number of entries in a CMY vs. RGB table
        such as 1 and 2.
    #endif
40    /*Example:*/ return(512);
    }
    /*
    *
55
50
55

```

```

5      *
      *
      *
      *
      *
      *
      */
int  ext13(i,j)      int i,j;
{
10  #ifdef COMMENTS_NOT_CODE
      Supply value of entry 'i', separation 'j' of the
      CMY side of a RGB|CMY table such as 1 and 2 in Fig 4.
  #endif
  /*Dummy:*/      return(0);
}
15  int  ext14(i,j)      int i,j;
{
  #ifdef COMMENTS_NOT_CODE
      Supply value of entry 'i', separation 'j' of the
      RGB side of a RGB|CMY table such as 1 and 2 in Fig 4.
  #endif
20  /*Dummy:*/      return(0);
}
int  ext15()
{
  #ifdef COMMENTS_NOT_CODE
      Supply the number of entries in a RGB table such as
      1 or 2 in Fig 4., but it which the CMY values are
      not listed but can be caculated from
      a description of a grid such as described above.
  #endif
  /*Example:*/      return(512);
}
30  int  ext16(p,i,j)      short *p; int i,j;
{
  #ifdef COMMENTS_NOT_CODE
      Supply an item of a table 'p', such as described in ext15,
      in the 'i'-th entry, in the 'j'-th separation.
  #endif
  /*Dummy:*/      return(0);
}
35  void ext17(p)      char *p;
{
  #ifdef COMMENTS_NOT_CODE
      Sometimes in the description above it is not clear if an ext..()
      function reffers to Table 36 of the printer, or to Table 32 of
      the proofer.
40  'p' is a string of characters terminated by null.
      If the last character, before the null, is 'a'
      than the following ext..() calls should reffer to the proofer.
      If the last character, before the null, is 'b'
      than the following ext..() calls should reffer to the printer.
55  #endif
}
/*
*

```

```

5      *
      *
      *
      *
      *
      *
      *
      *
      *
      *
10     ***** Interface to PAT2 *****
      #ifdef COMMENTS_NOT_CODE
      The maximum number of dimensions in color space here is 4.
      #endif

      int      ext20(i)          int i;
      {
15     #ifdef COMMENTS_NOT_CODE
      This is the same as ext8(), but it is used as input for pat2.
      'i' is in the range 0 to 3
      A value of 1 for 'i' = 3 signals the existence
      of only 3 separations.
      The returned value must be in the range 0 to 10
20     #endif
      }

      int      ext21(i,j)        int i,j;
      {
25     #ifdef COMMENTS_NOT_CODE
      This is the same as ext10(), but as input for pat2.
      'i' is in the range 0 to 3
      'j' is in the range 0 to 10
      #endif
      }

      short    *ext22()
30     {
      #ifdef COMMENTS_NOT_CODE
      This supplies pat2 with Table 36,
      and in the same format as in ext6().
      #endif
      }

35     int      ext23(i)          int i;
      {
      #ifdef COMMENTS_NOT_CODE
      This defines the dimensions of Table 42 in the same way
      as ext8() and ext20(), but referring to the output of pat2.
40     'i' is in the range 0 to 3
      #endif
      }
      /*
      *

```

```

5      *
      *
      *
      *
      *
      */
      int      ext24(i,j)      int i,j;
10     {
      #ifdef  COMMENTS_NOT_CODE
      This defines the dimensions of Table 42 in the same way
      as ext10() and ext21(), but referring to the output of pat2.
      'i' is in the range 0 to 3
      'j' is in the range 0 to 32
15     #endif
      }
      void      ext27(iv,i,f)      int iv[4],i;      float f;
      {
      #ifdef  COMMENTS_NOT_CODE
20     This routine gets the output from pat2.
      'iv' is a vector of values in the range 0..32, indexes
      to the grid defined using ext24, and so defining a point in the
      color space. This is an entry in CMY to CMY Table 42.
      'f' is the 'i'-th value written in this table, at this entry.
      pat2 calls ext27 for all entries 'iv' and all dimensions 'i'.
25     #endif
      }

```

Claims

- 30 1. A technique for calibrating a color processing device comprising the steps of:
 - comparing a first digital representation of a colored image with a second digital representation thereof, said first digital representation defining a plurality of first non-scalar color values, said second digital representation defining a plurality of second non-scalar color values corresponding to the plurality of said first non-scalar color values, thereby to provide a transformation pairing each individual one of said first non-scalar color values with a value relatively close to the corresponding one of said second non-scalar color values; and
 - employing at least the transformation to control operation of said color processing device to be calibrated.
 - 40 whereby the color processing device may be calibrated generally without reference to human aesthetic judgement.
- 45 2. Apparatus for sampling the color processing characteristics of a color processing device, said color processing device being operative to convert a first representation of a colored image to a second representation thereof, said sampling apparatus comprising:
 - a first representation of a colored image characterized in that processing said first representation of said colored image with the color processing device provides a second representation of said colored image which defines a provided plurality of color values, each individual one of said provided plurality of color values being substantially equal to a corresponding one of a predetermined plurality of color values falling within the range of said color processing device.
 - 50
- 55 3. A method of constructing apparatus for sampling the color processing characteristics of a color processing device, said color processing device being operative to convert a first representation of a colored image to a second representation thereof,
 - the method comprising the step of repeating at least once the steps of:
 - providing first and second representations of a colored image, said representations respectively comprising a first multiplicity of first color values and a second multiplicity of second color values corresponding thereto, said first and second representations being characterized in that processing said

first representation with said color processing device defines said second representation.

comparing the first representation of the colored image with the second representation thereof, thereby to provide a transformation, characterized in that operating said transformation on each individual one of said second multiplicity of second color values gives a value substantially equal to the

corresponding one of said first multiplicity of first color values; and
operating the transformation on said first representation of the colored image, thereby to provide a third representation thereof.

4. A technique for quality control of a color processing device operative to convert a first representation of a colored image to a second representation thereof, the technique comprising the steps of:

providing apparatus for sampling the color processing characteristics of the color processing device, said sampling apparatus comprising a first representation of a colored image characterized in that processing said first representation of said colored image with the color processing device provides a second representation of said colored image which defines a provided plurality of color values, each individual one of said provided plurality of color values being substantially equal to a corresponding one of a predetermined plurality of color values falling within the range of said color processing device;

processing said sampling apparatus on said color processing device; and
employing the results of the processing step of control operation of the color processing device.

5. A technique for repeatability testing of a color processing device operative to convert a first representation of a colored image to a second representation thereof, the technique comprising the steps of:

providing apparatus for sampling the color processing characteristics of the color processing device, said sampling apparatus comprising a first representation of a colored image characterized in that processing said first representation of said colored image with the color processing device provides a second representation of said colored image which defines a provided plurality of color values, each individual one of said provided plurality of color values being substantially equal to a corresponding one of a predetermined plurality of color values falling within the range of said color processing device;

processing said sampling apparatus on said color processing device;
repeating said step of processing on at least one further occasion; and
comparing the results of at least two repetitions of said processing steps.

6. A method for transforming an element of a domain of a first color printing device to an element of a domain of a second color printing device, the method comprising the steps of:

providing a first transformation from a first digital representation of a colored image to a second digital representation thereof and a second transformation from a third digital representation of a colored image to a fourth digital representation thereof, said second transformation corresponding to said second color printing device, said first transformation corresponding to said first color printing device and said second and fourth digital representations being defined within a single color space; and
comparing said first transformation with said second transformation.

7. A method for quantifying the appearance of an analog representation of a location of a colored image comprising the step of:

providing an n-dimensional representation of said location, wherein n is at least 4.

8. Apparatus for transforming an element of a domain of a first color printing device to an element of a domain of a second color printing device comprising:

means for providing a first transformation from a first digital representation of a colored image to a second digital representation thereof and a second transformation from a third digital representation of a colored image to a fourth digital representation thereof, said second transformation corresponding to said second color printing device, said first transformation corresponding to said first color printing device and said second and fourth digital representations being defined within a single color space; and
means for comparing said first transformation with said second transformation.

9. Apparatus for quantifying the appearance of an analog representation of a location of a colored image comprising:

means for providing an n-dimensional representation of said location, wherein n is at least 4.

10. A system for converting between a digital and an analog representation of an image comprising:
a translation system for translating a reading and writing point across a substrate.
a color proofer comprising said writing point for writing, from said digital representation, said analog representation onto said substrate; and
5 a color reading system comprising said reading point for reading said digital representation from said analog representation.
11. A technique for controlling the operation of an image processing device having a first color coordinate system and comprising the steps of:
10 receiving a digital representation of a color image defined in a second color coordinate system;
providing a transformation between said first color coordinate system and said second color coordinate system;
employing said transformation to transform said digital representation of said color image into a transformed digital representation of said color image in said first color coordinate system; and
15 employing said image processing device to modify said transformed digital representation of said color image.
12. An image processing device having a first color coordinate system comprising:
means for receiving a digital representation of a color image defined in a second color coordinate
20 system;
transformation construction means for providing a transformation between said first color coordinate system and said second color coordinate system; and
means for employing said transformation to transform said digital representation of said color image into a transformed digital representation of said color image in said first color coordinate system,
25 wherein said image processing device is operative to modify said transformed digital representation of said color image.

30

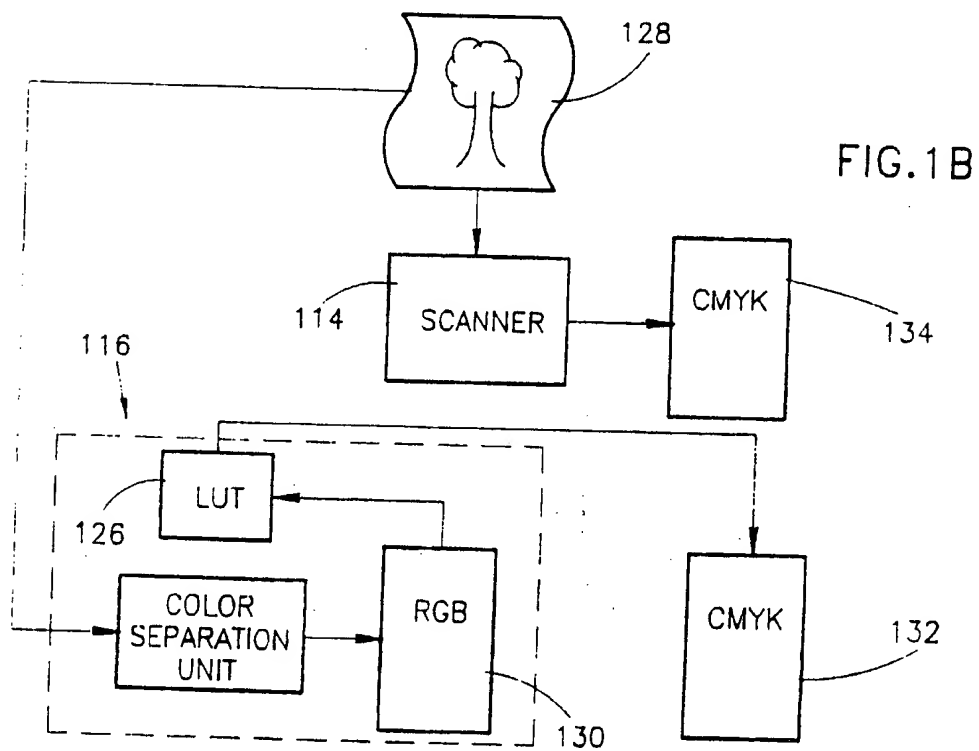
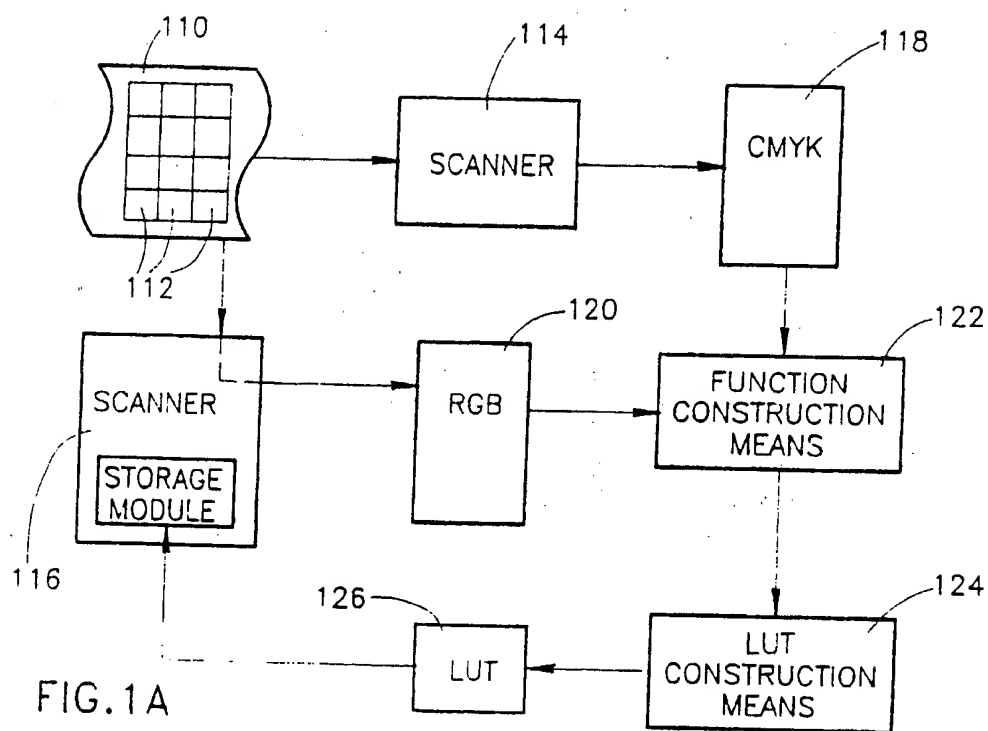
35

40

45

50

55



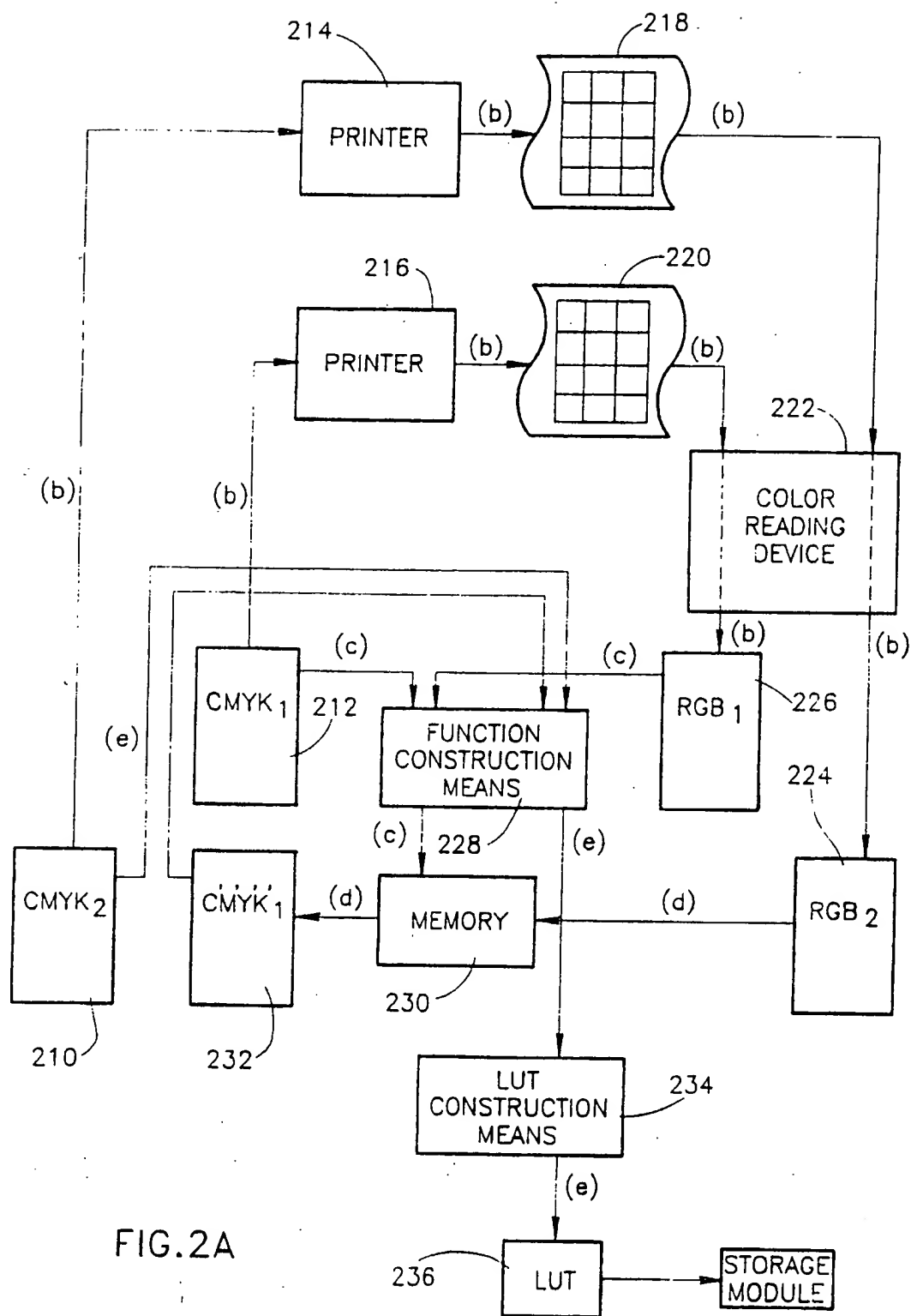


FIG. 2A

FIG.2B

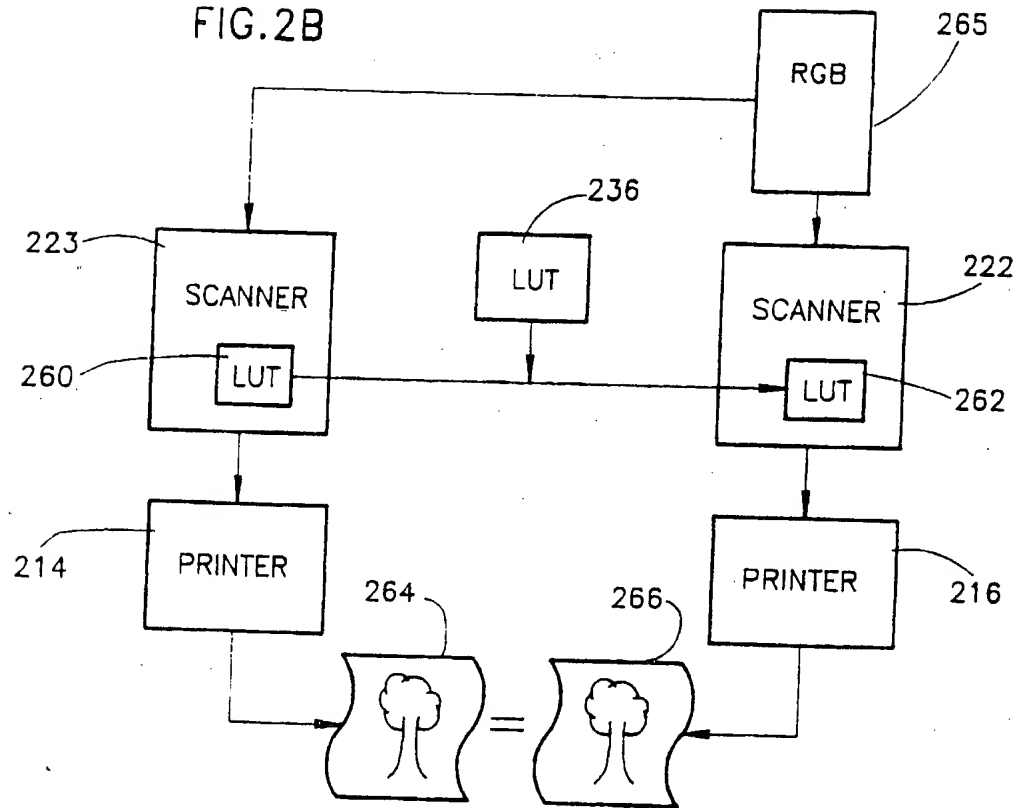
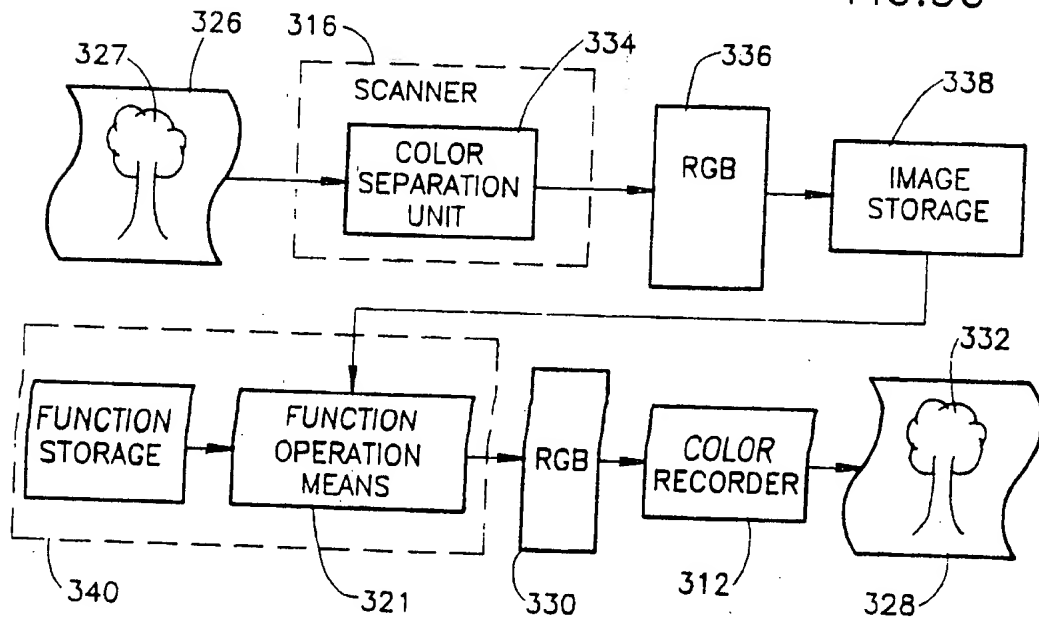


FIG.3C



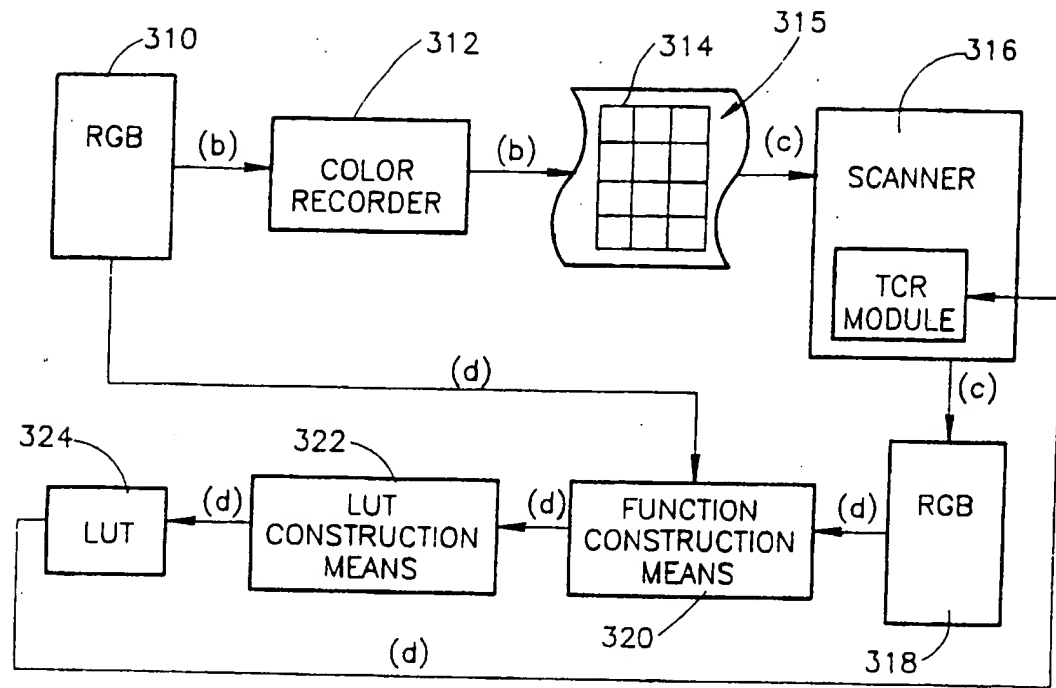


FIG.3A

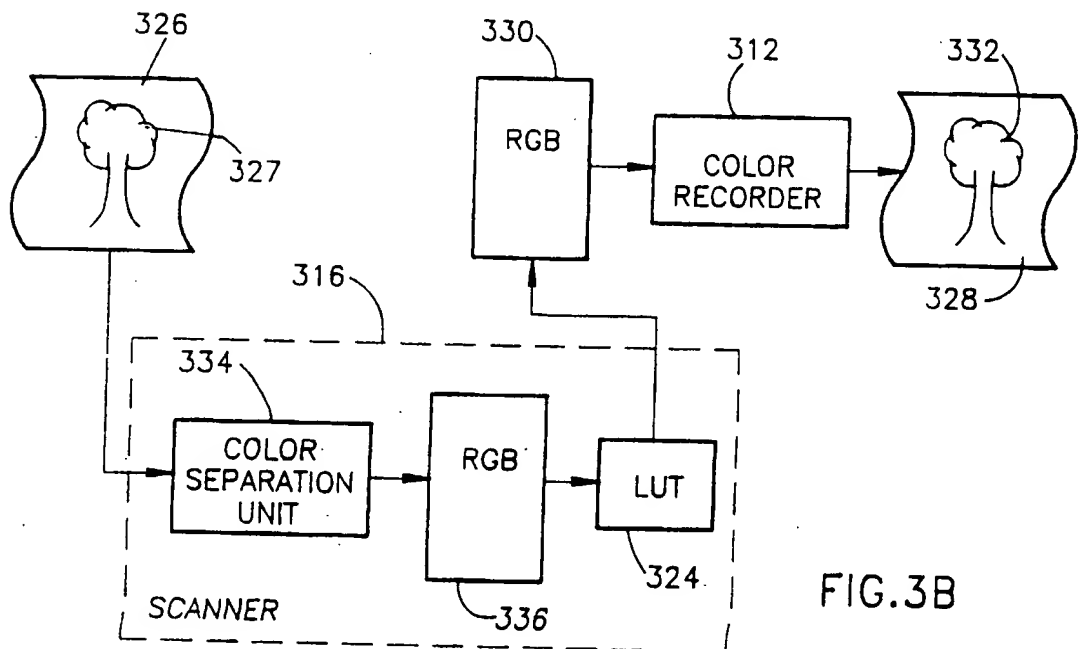


FIG.3B

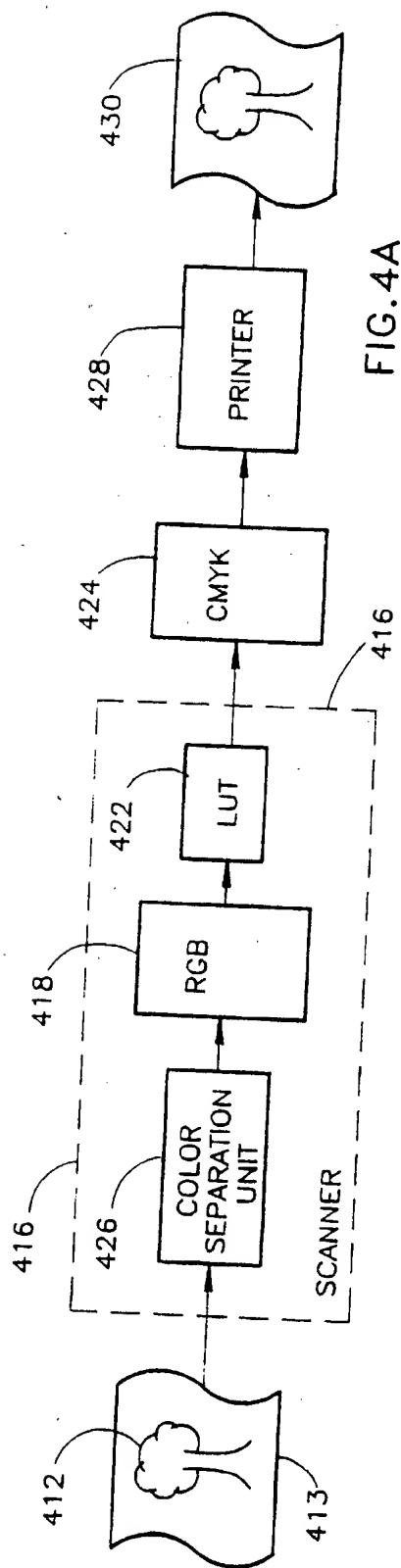


FIG. 4A

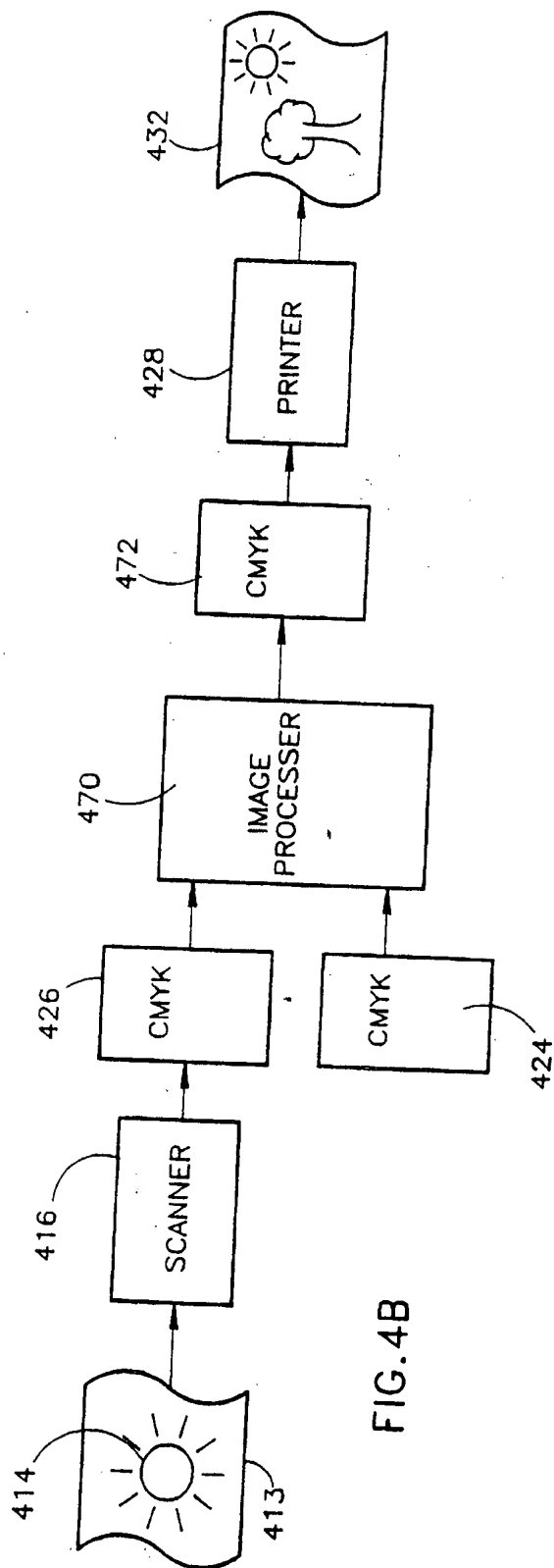


FIG. 4B

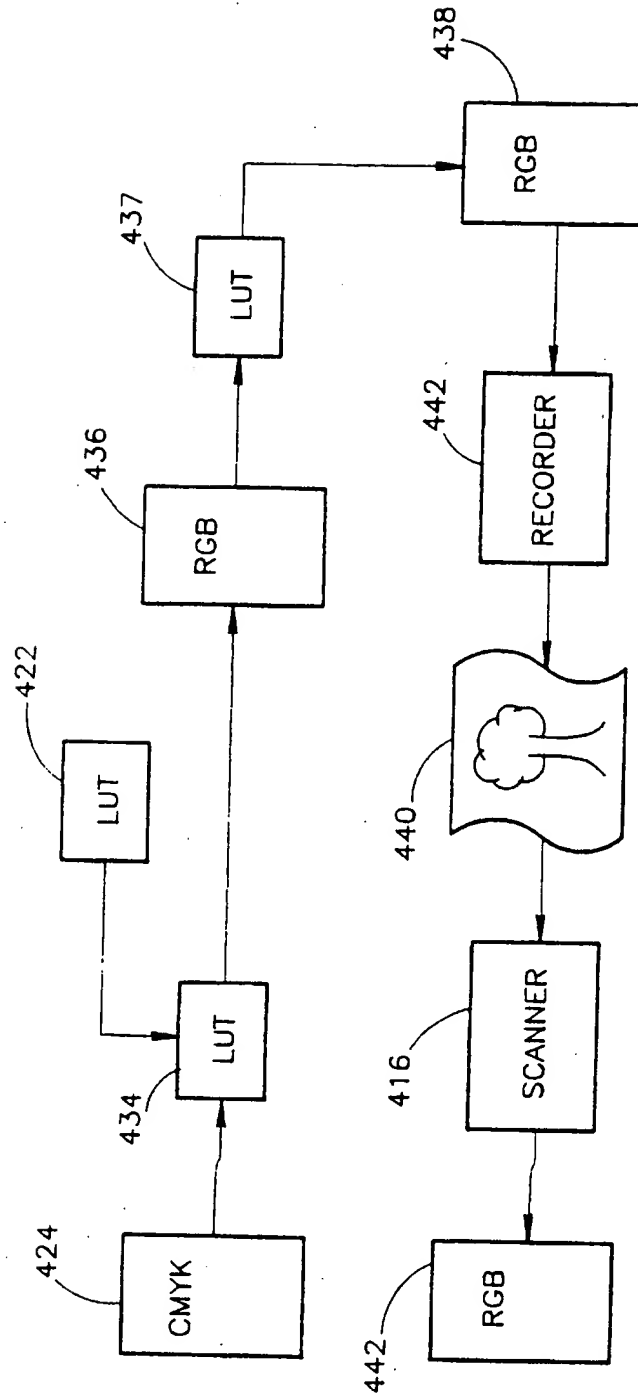
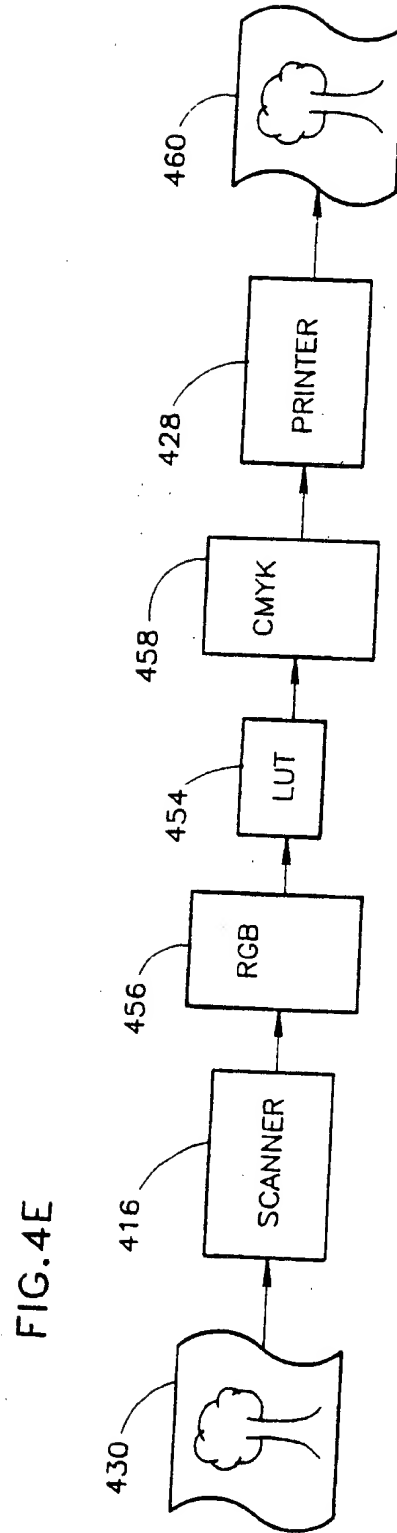
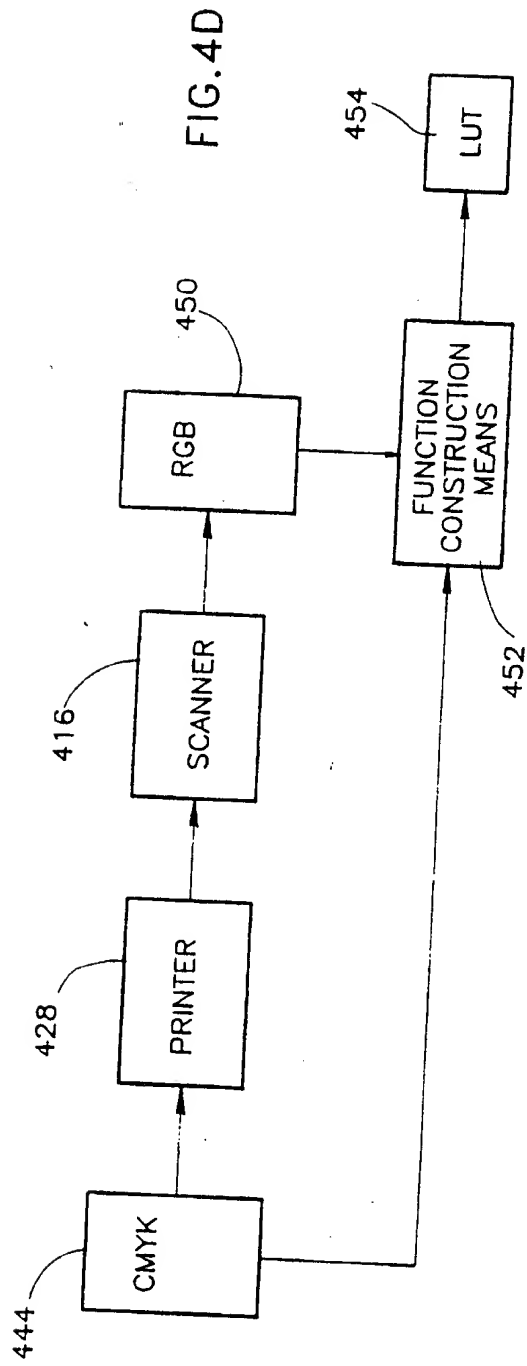


FIG. 4C



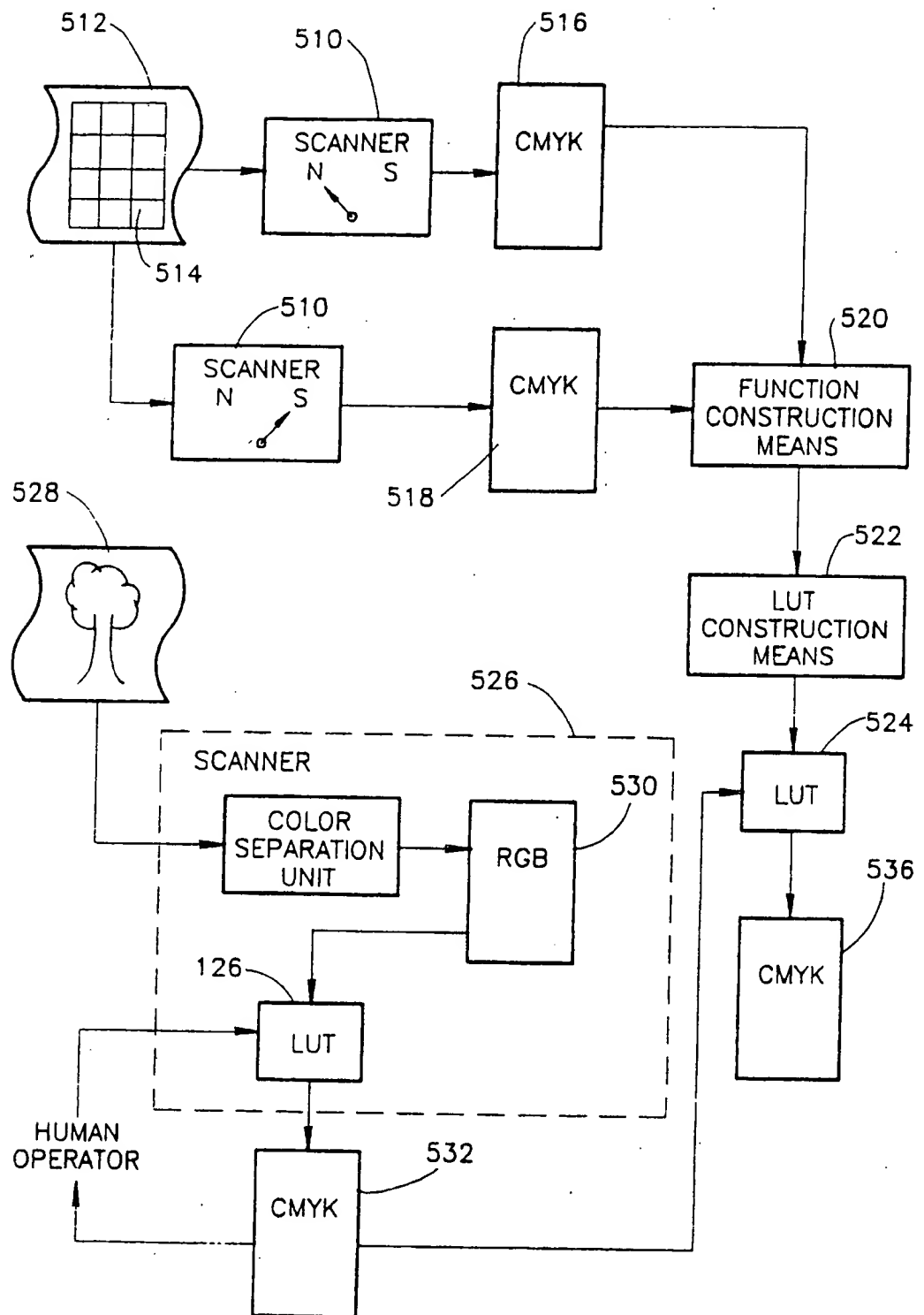


FIG.5A

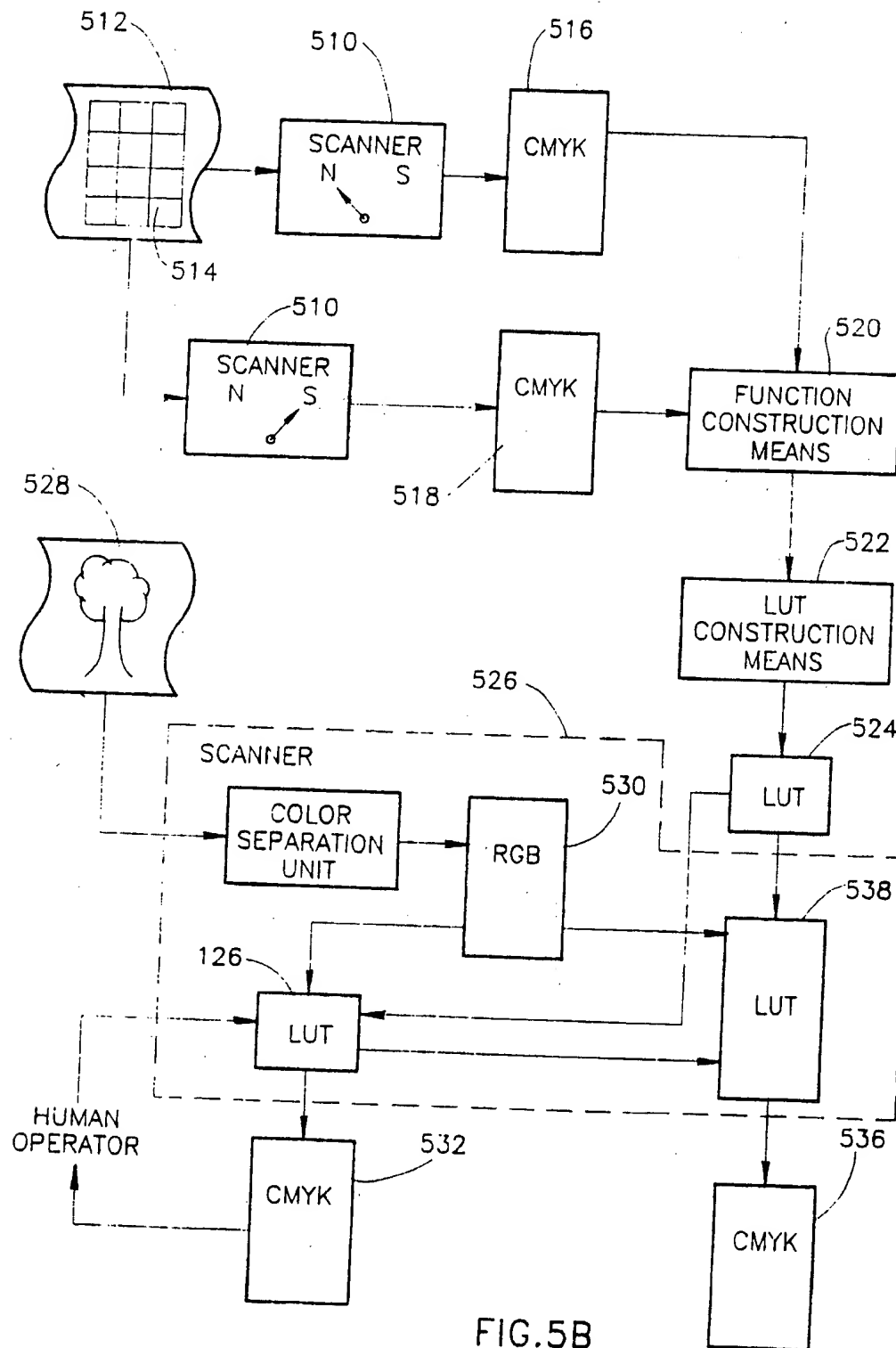


FIG.5B

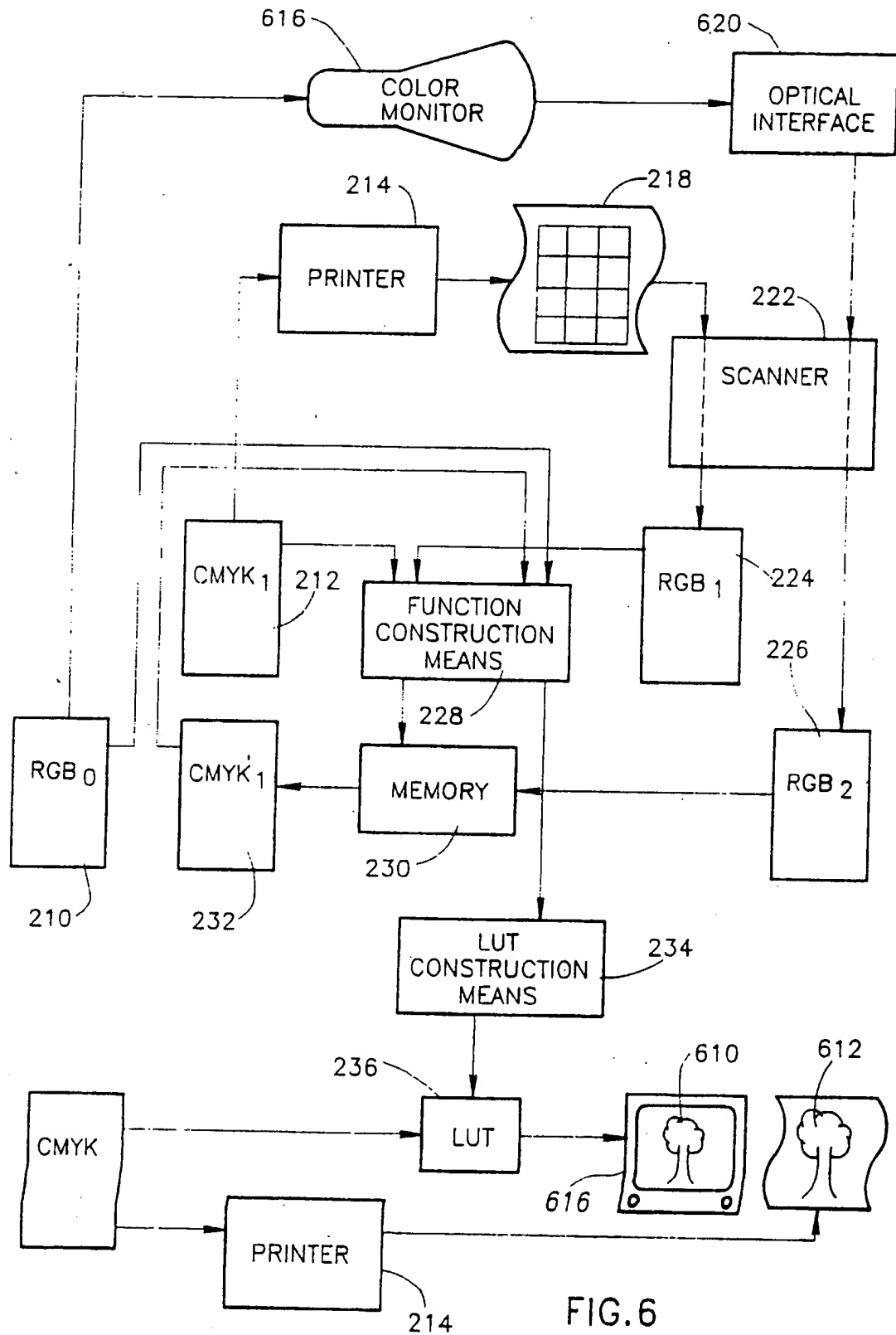


FIG.6

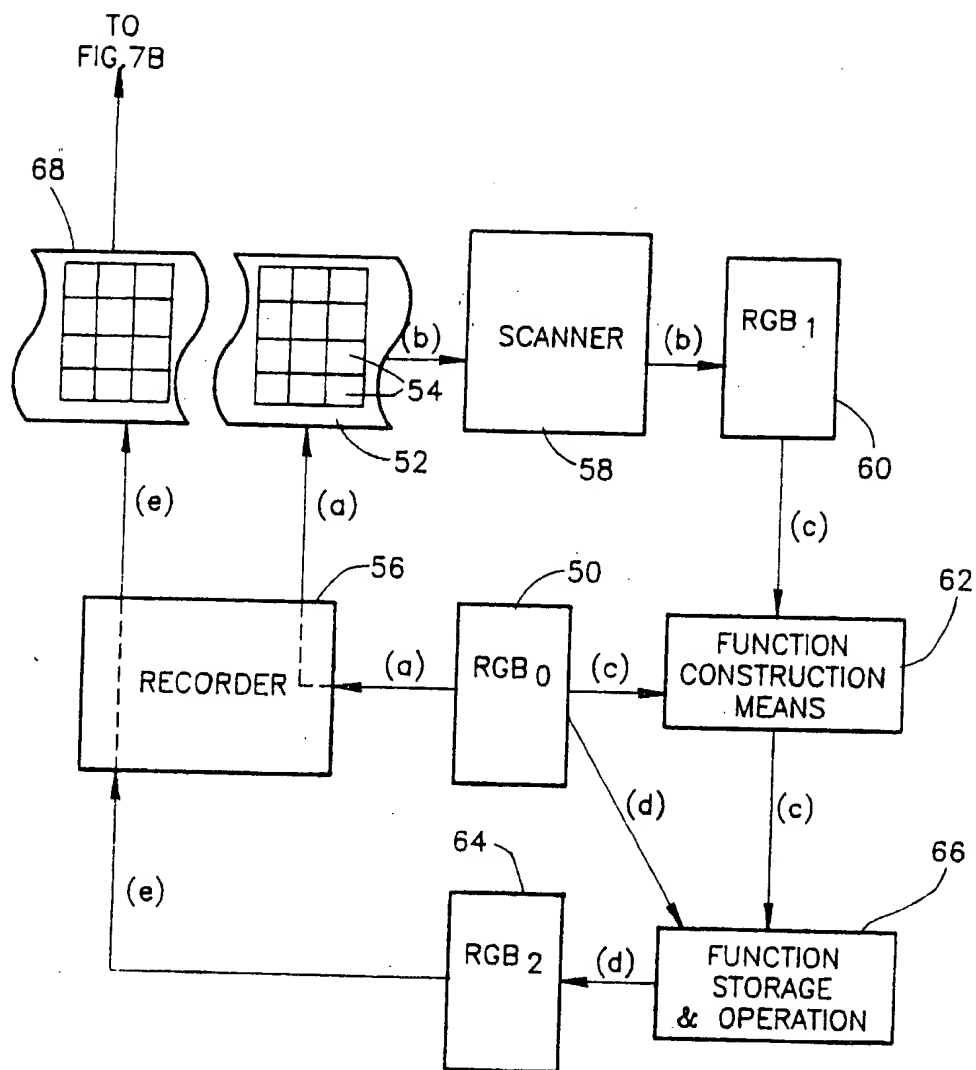


FIG.7A

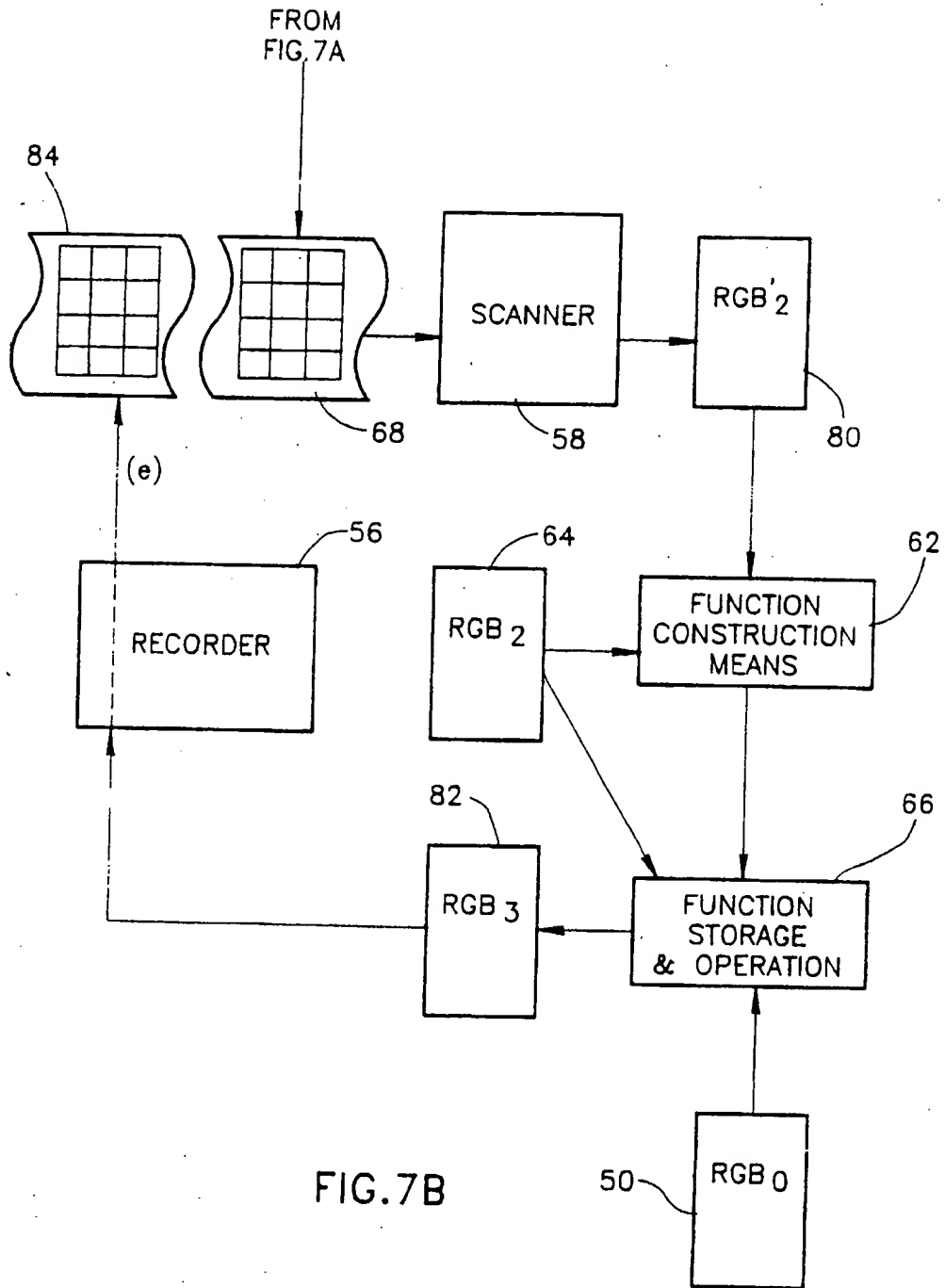


FIG.7B

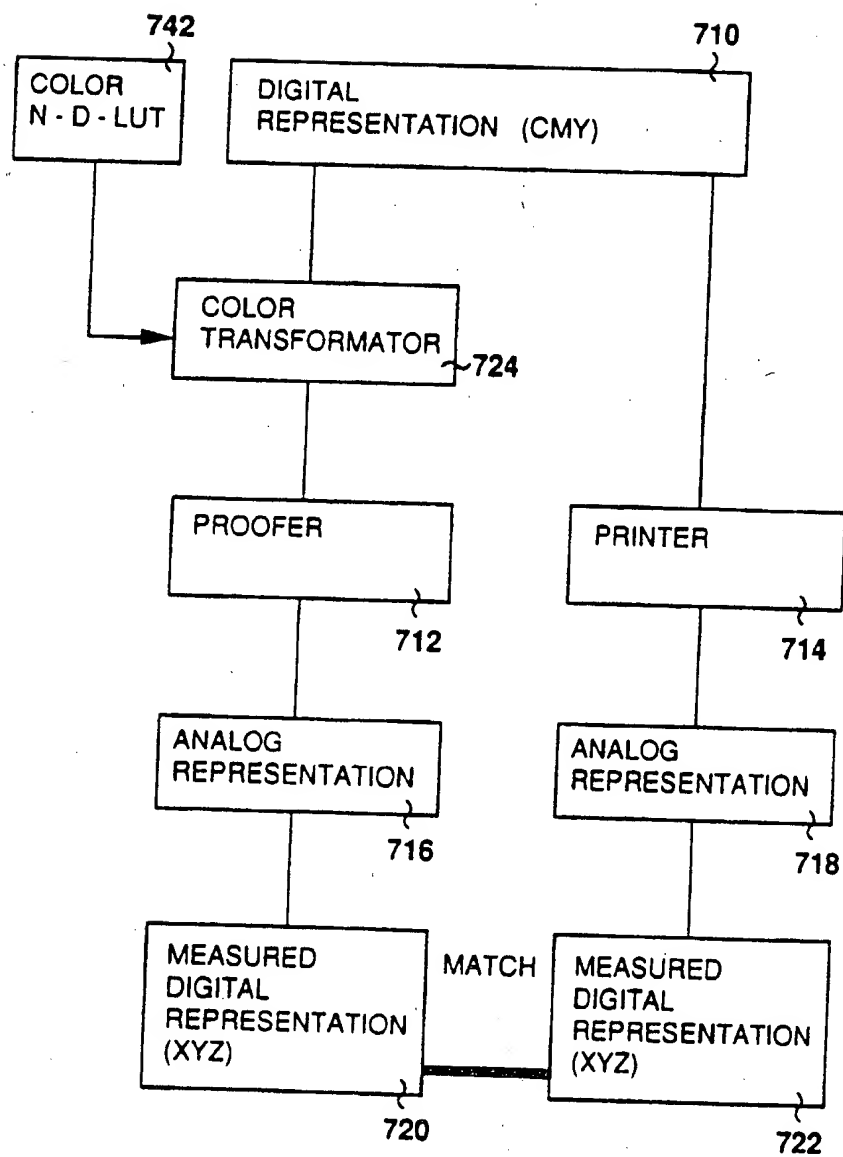


FIG. 8

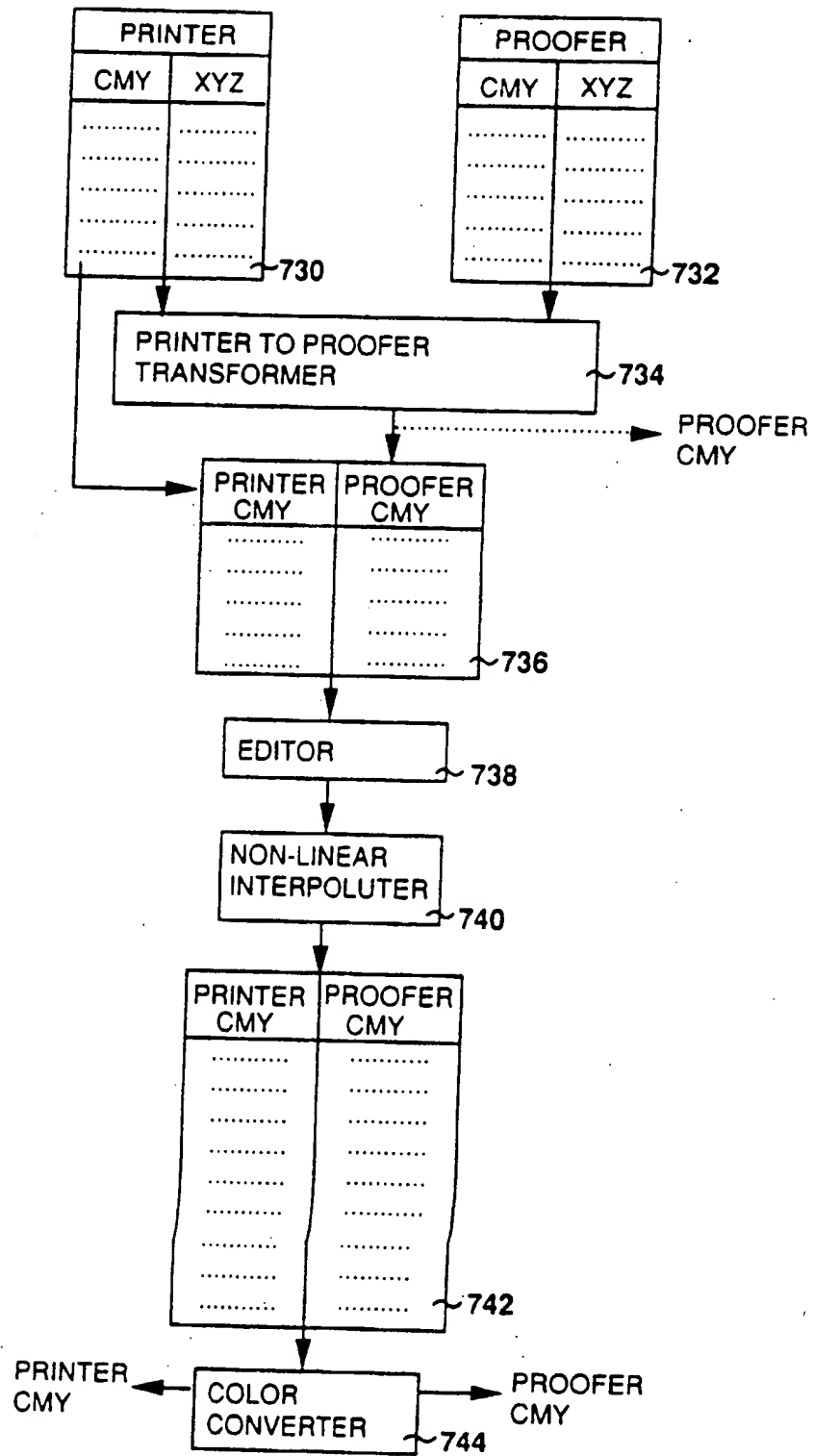


FIG. 9

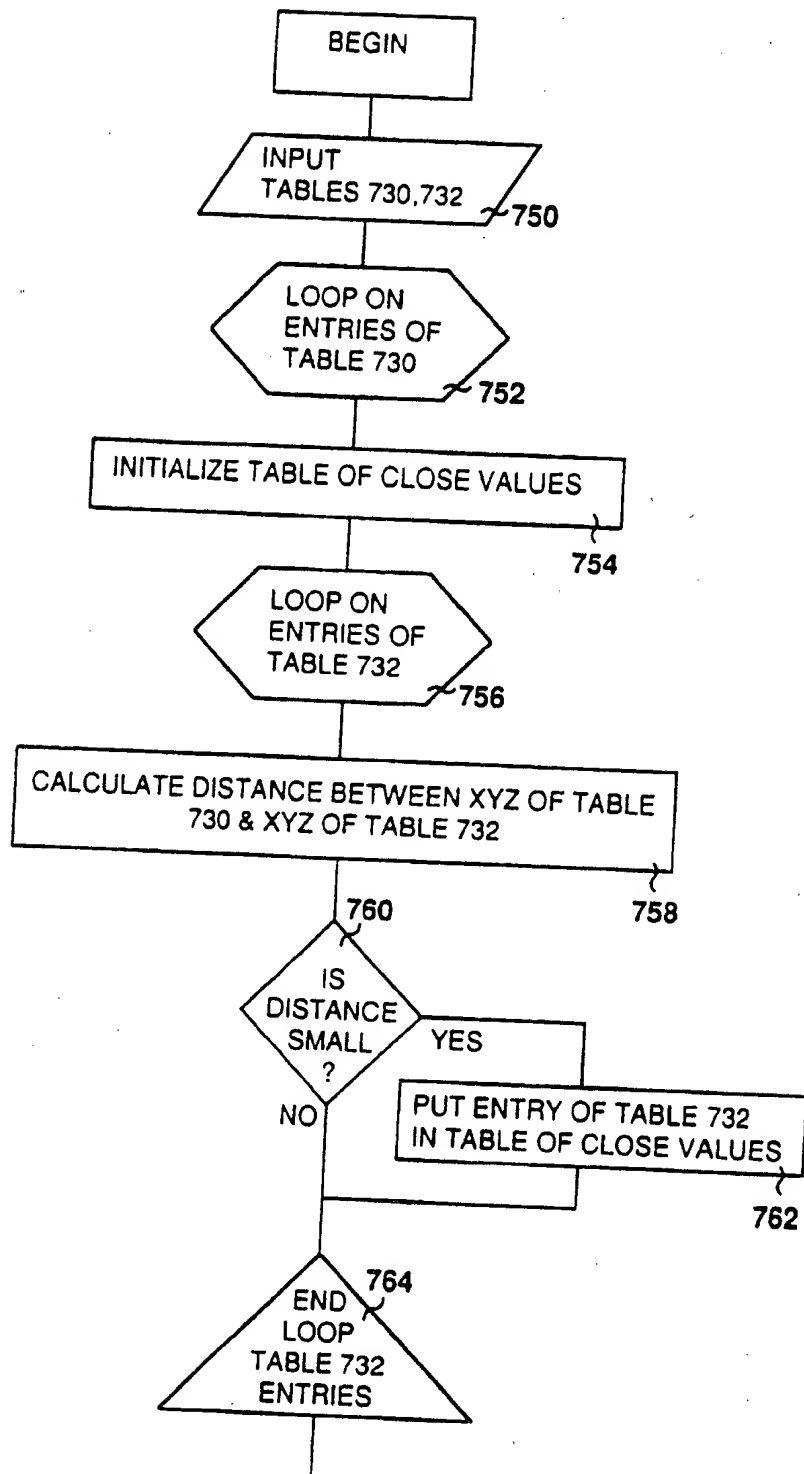


FIG.10/1

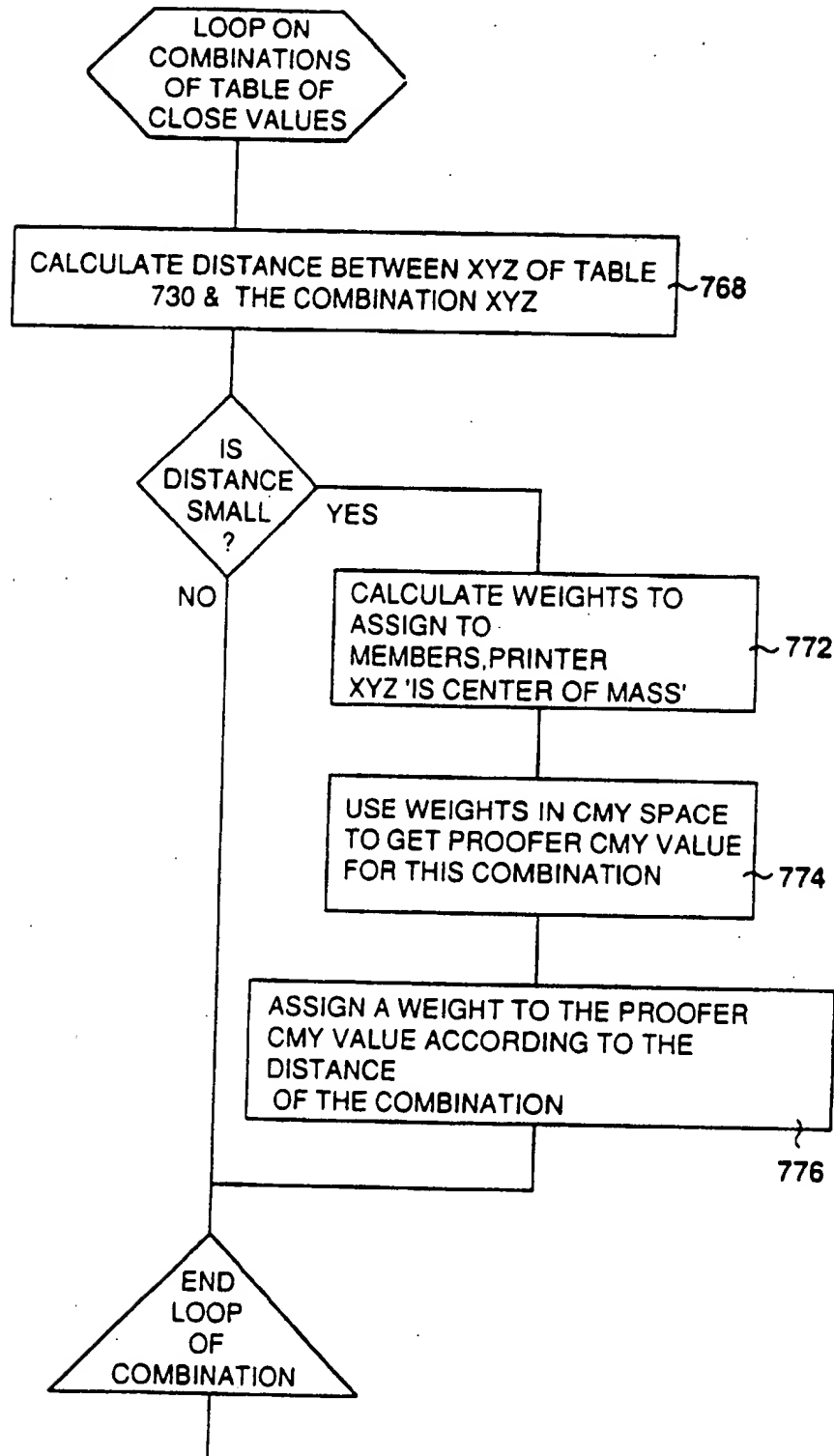


FIG.10/2

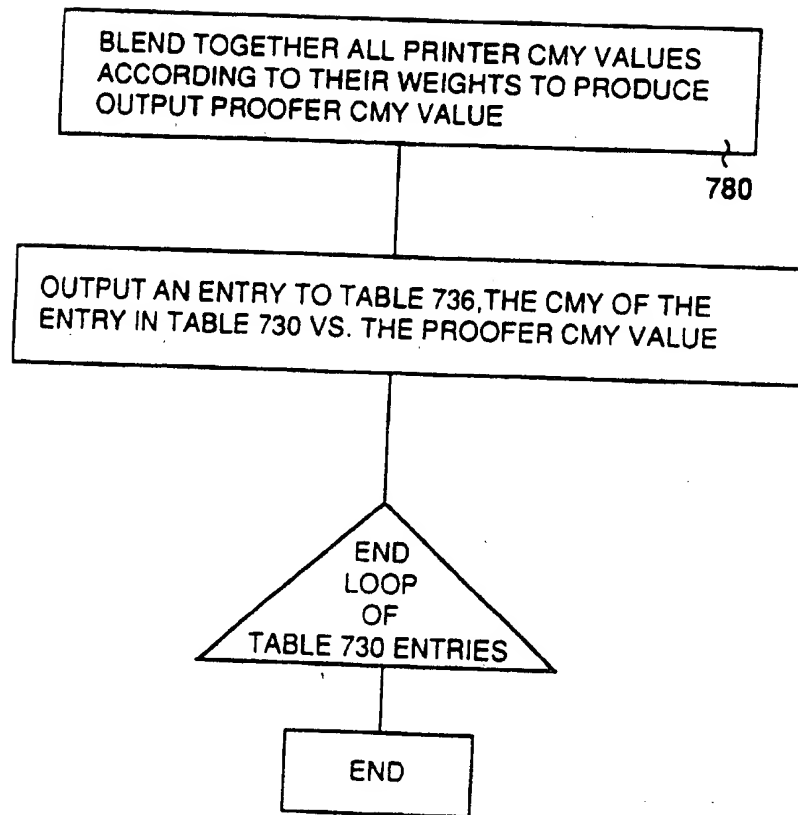


FIG.10/3

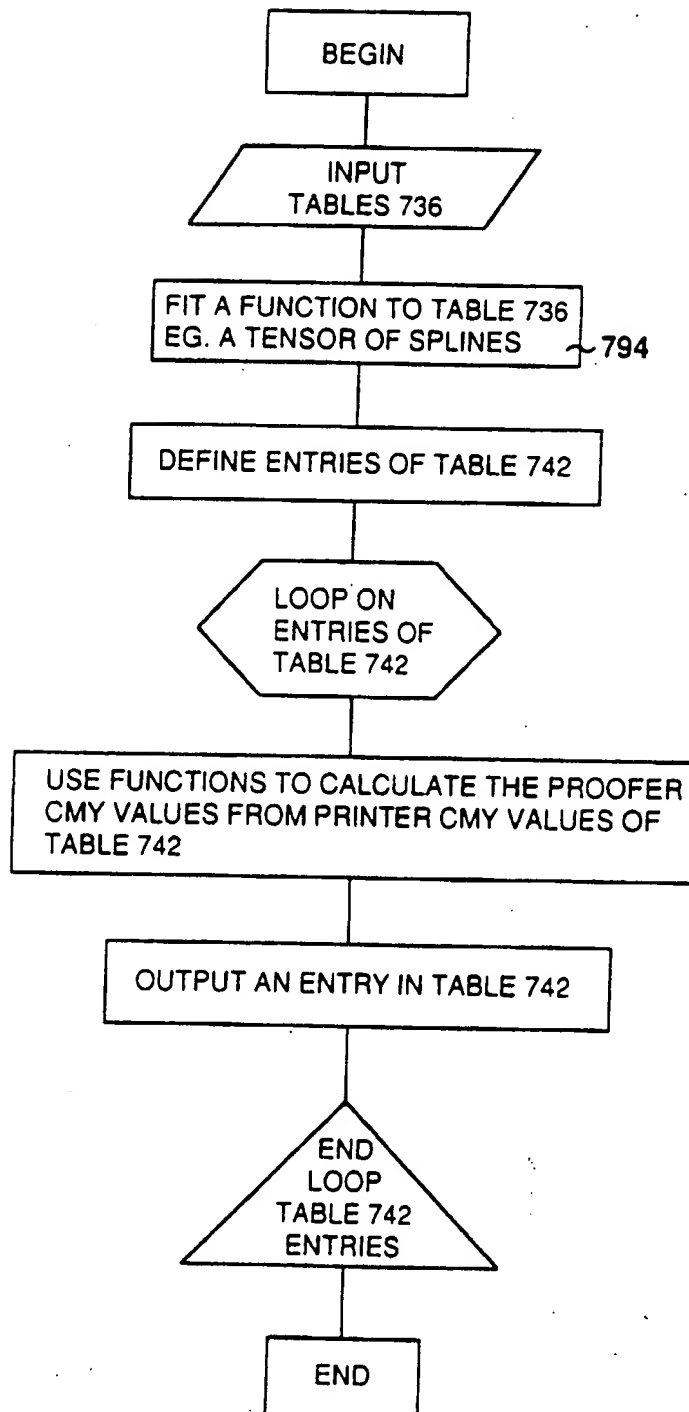


FIG.11

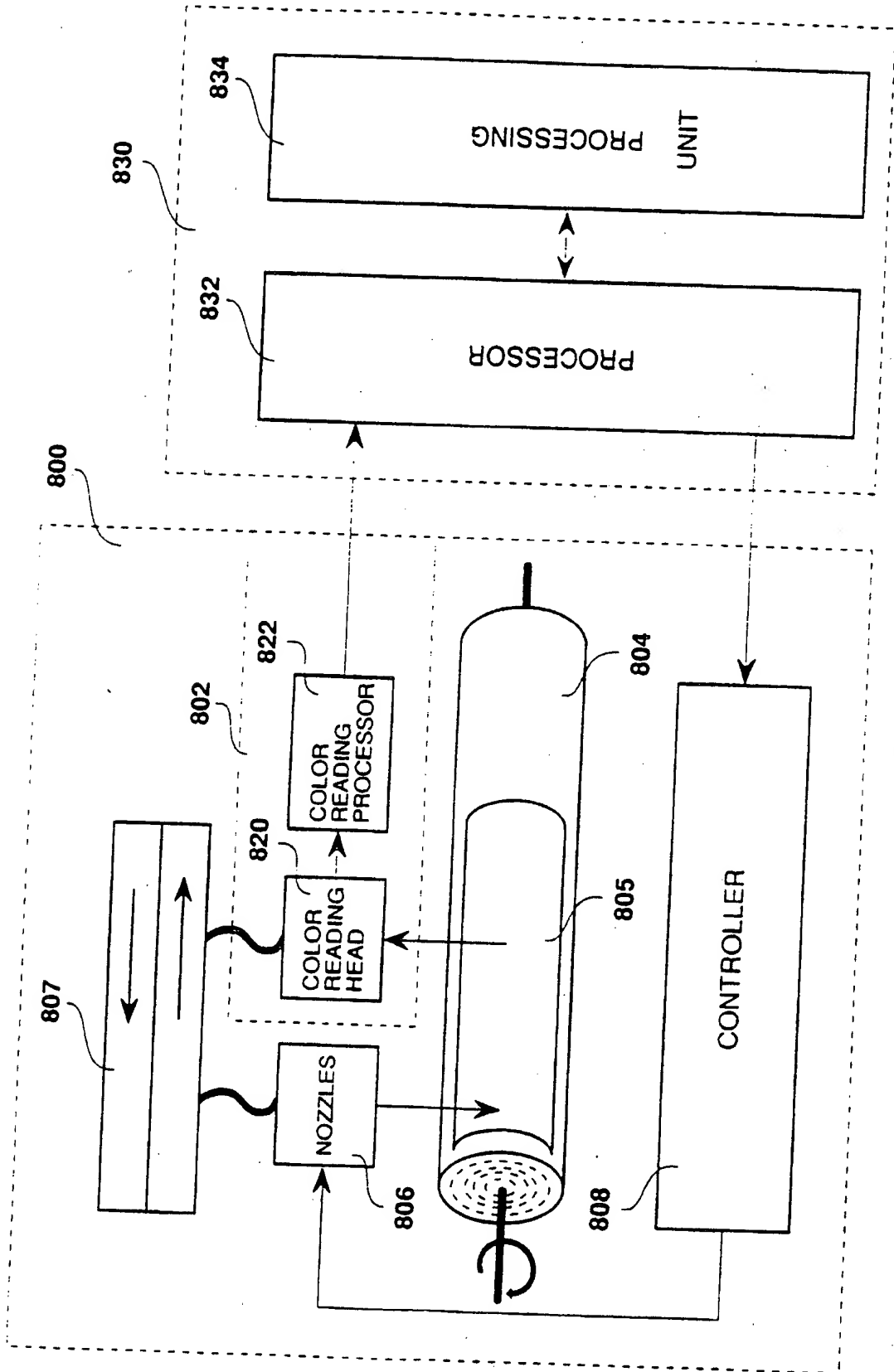


FIG. 12

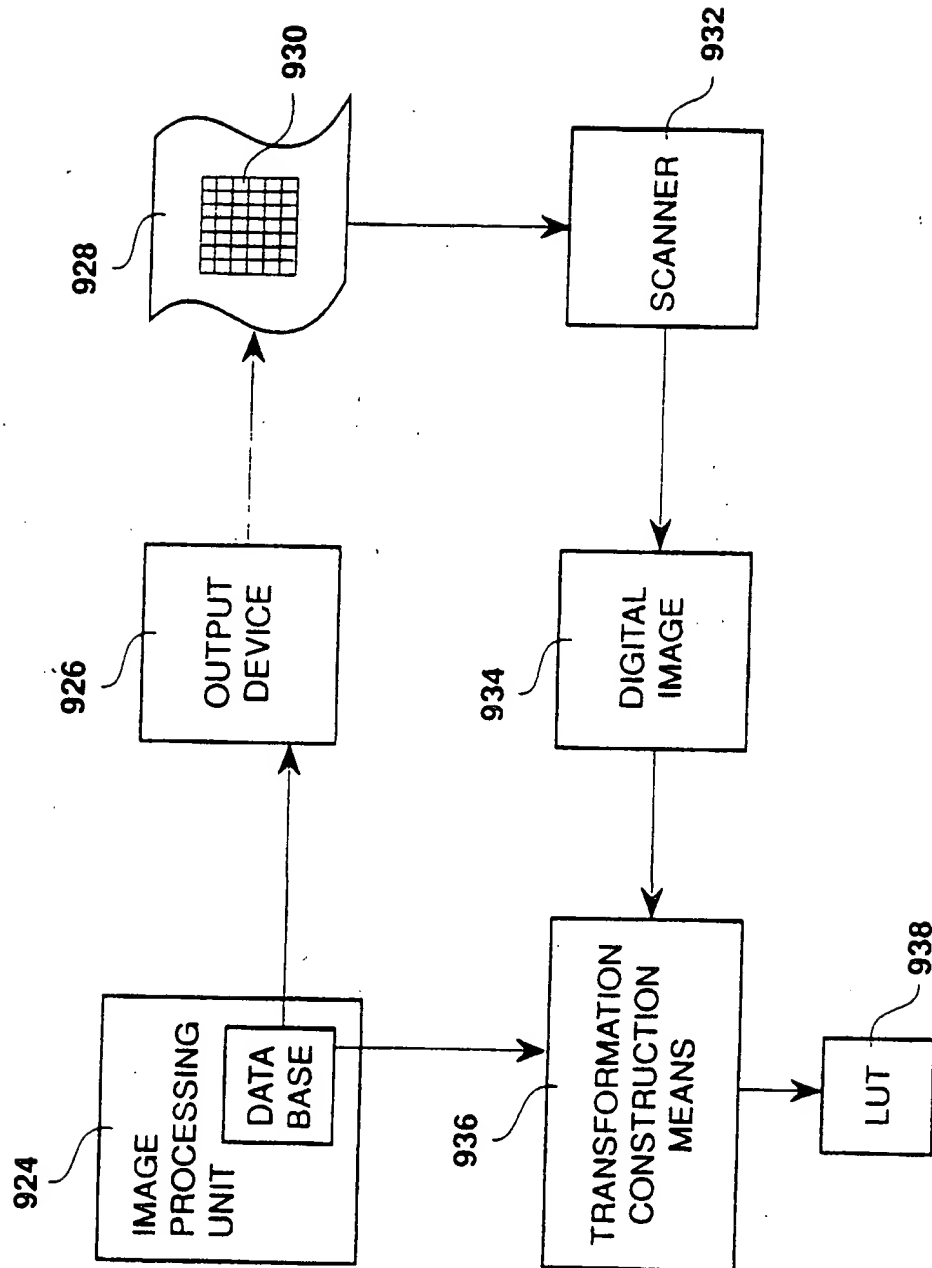


FIG. 13

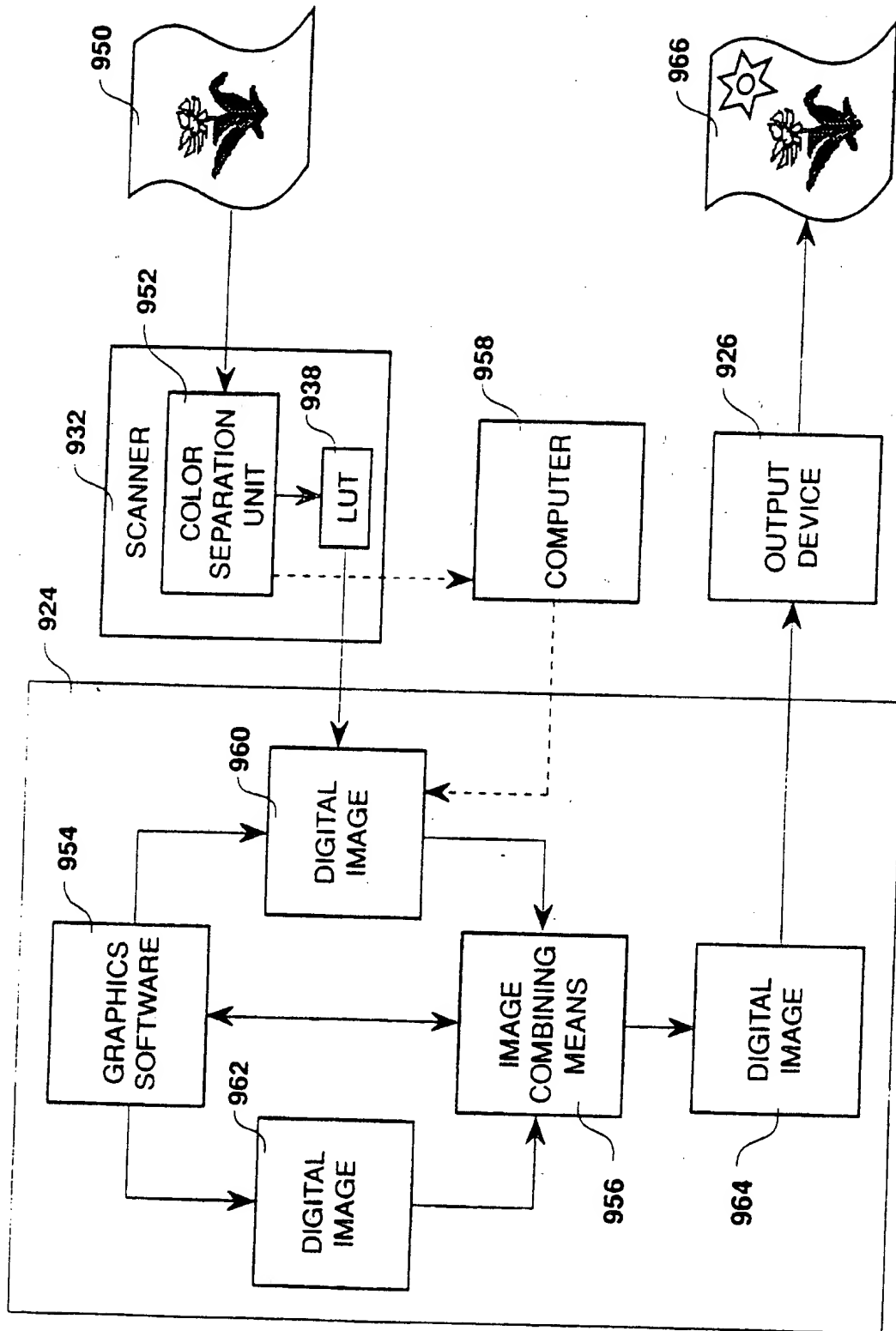


FIG. 14

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 475 554 A3

(12)

EUROPEAN PATENT APPLICATION(21) Application number: **91300904.9**(51) Int. Cl.⁵: **H04N 1/46**(22) Date of filing: **04.02.91**

(30) Priority: **27.12.90 IL 96816**
30.12.90 IL 96829
15.01.91 IL 96955
05.02.90 IL 93274

(43) Date of publication of application:
18.03.92 Bulletin 92/12

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU NL SE

(88) Date of deferred publication of the search report:
23.06.93 Bulletin 93/25

(71) Applicant: **SCITEX CORPORATION LTD.**
7 Hamada Street
Herzliya 46103(IL)

(72) Inventor: **Smilansky, Zeev**
7 Beeri Street
Rehovot(IL)

Inventor: **Melman, Haim Zvi**
3 Hagai Street
Kfar Saba(IL)

Inventor: **Bresler, Yoav**
24 Refidim Street
Tel Aviv(IL)

Inventor: **Litvak, Matty J.**
42 Ha'atzmaut Street
Petach Tikva(IL)

Inventor: **Kreitman, Haim**
14/3 Hagra Street
Kfar Saba(IL)

Inventor: **Yad-Shalom, Itai**
6 Hagilad Street
Kfar Saba(IL)

(74) Representative: **Hillier, Peter et al**
Reginald W. Barker & Co., 13, Charterhouse
Square
London, EC1M 6BA (GB)

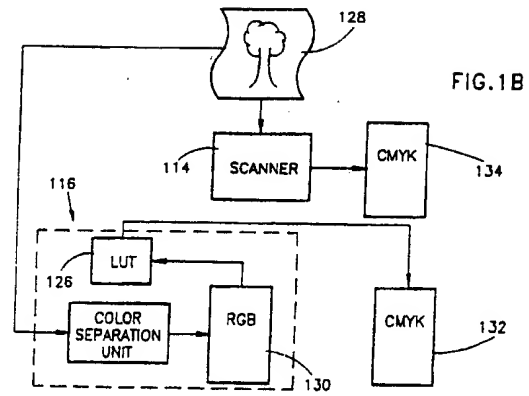
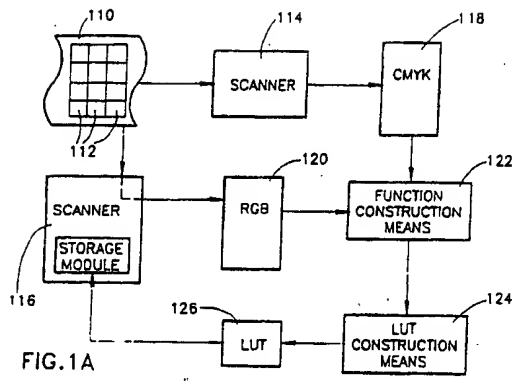
(54) **Apparatus and method for colour calibration.**

(57) There is disclosed technique and apparatus for calibrating a color processing device. The technique includes the steps of comparing a first digital representation of a colored image with a second digital representation thereof and employing at least the transformation to control operation of the color processing device to be calibrated. The first digital representation defines a plurality of first non-scalar color values and the second digital representation defines a plurality of second non-scalar color values corresponding to the plurality of the first non-scalar color values, thereby to provide a transformation pairing each individual one of the first non-scalar color values with a value relatively close to the corresponding one of the second non-scalar color values. The color processing device may be calibrated generally without reference to human aesthetic judgement.

There is additionally provided a method and

apparatus for transforming an element of a domain of a first color printing device to an element of a domain of a second color printing device. The method comprises the steps of providing a first transformation from a first digital representation of a colored image to a second digital representation thereof and a second transformation from a third digital representation of a colored image to a fourth digital representation thereof and comparing the first transformation with the second transformation. The second transformation corresponds to the second color printing device, the first transformation corresponds to the first color printing device and the second and fourth digital representations are defined within a single color space.

EP 0 475 554 A3





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 30 0904

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,X Y A	EP-A-0 144 188 (XEROX) * page 2, paragraph 2 - page 6, paragraph 4 * ---	1-5, 10-12 7,9 6,8	H04N1/46
D,Y	ACM TRANSACTIONS ON GRAPHICS vol. 7, no. 4, October 1988, pages 249 - 292 M. C. STONE ET AL. 'Color Gamut Mapping and the Printing of Digital Color Images' * page 255, paragraph 2.4 * * page 261, paragraph 332 * ---	7,9	
A	PATENT ABSTRACTS OF JAPAN vol. 13, no. 327 (M-854)24 July 1989 & JP-A-11 10 154 (MATSUSHITA) 26 April 1989 * abstract *	-	
A	& PATENT ABSTRACTS OF JAPAN vol. 13, no. 364 (E-805)14 August 1989 & JP-A-11 20 965 (MATSUSHITA) 12 May 1989 * abstract *	-	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	& PATENT ABSTRACTS OF JAPAN vol. 14, no. 168 (E-912)30 March 1990 & JP-A-20 23 776 (MATSUSHITA) 25 January 1990 * abstract *	-	H04N
P,A	& US-A-4 929 978 (KANAMORI ET AL.) 29 May 1990 ---	-	
A	FR-A-2 455 307 (DAINIPPON SCREEN SEIZO K.K.) -----	-	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 08 APRIL 1993	Examiner DE ROECK A.F.A.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document			

This Page Blank (uspto)

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.

This Page Blank (uspto)